256

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CONTENTS

TRADE NAME	MODEL	SET AND FOLDER No.
Admiral	C2216AZ, C2236A, F2226, K2216A, K2217A, T2216A, T2217A (Ch. 20A2, 20A2Z, 20D2) Tel. Rec.	256-2
Admiral	5D31, 5D32, 5D33 (Ch. 5D3)	256-3
Airline	25GHM-2012A, 35GHM-2012A, 35GHM-2020A	256-4
Airline	45BR-3186A Tel. Rec.	256-5
Airline	61-6787	256-6
Bell Sound	3D	256-7
Bell Sound	2150, 2150R	256-8
Firestone	13-G-150 Tel. Rec.	256-9
Hoffman	7B141, U, 7M140, U (Ch. 300-17), 21B144, U, 21B318, U, 21B719, U (Ch. 300-21), 21B911 (Ch. 375-21), 21M143, U, 21M317, U, 21M718, U (Ch. 300-21), 21M910 (Ch. 375-21), 21P145, U, 21P720, U (Ch. 300-21), 21P912 (Ch. 375-21) Tel. Rec. Prod. Chg. Bul. 108	256-1
Motorola	BK3A6, CT2A6, GMT3A6, HJ3A6, HN2A6, HN3A6, HT3A6, KR3A6, OE2A6, PC2A6, PD3A6, SR2A6, SR3A6 (Ch. R-15A6, P6-2, P8-2)	256-10
Olympic	HF500	256-11
Packard Bell	631	256-12
TDC Sterotone	130 Recorder	256-13

HOFFMAN MODELS 7B141, U, 7M140, U (Ch. 300-17), 21B144, U, 21B318, U, 21B719, U (Ch. 300-21), 21B911 (Ch. 375-21), 21M143, U, 21M317, U, 21M718, U (Ch. 300-21), 21M910 (Ch. 375-21), 21P145, U, 21P720, U (Ch. 300-21), 21P912 (Ch. 375-21).

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 6 IN SET 236

Ch. 375-21

Hoffman Models 21B911, 21M910 and 21P912 (Ch. 375-21) are similar to chassis 300-21, covered in Photofact Folder 6 - Set 236. A list of the differences between Ch. 375-21 and 300-21 is given below.

AM TUNER ADDED

An AM tuner is used in Ch. 375-21. A partial schematic showing this tuner is given in Fig. 1 and alignment instructions are given below.

When the AM tuner is used a AM-TV-Phono switch is added to the chassis, R98 is then connected to 245 volts thru the switch, and R93 is omitted and pin 4 (screen) of V18 is connected to 130 volts thru the switch.

AUDIO CIRCUIT REVISED

A revised audio circuit is used in Ch. 375-21. A partial schematic is given in Fig. 2, which shows this circuit.

In the revised audio circuit the 130V line cannot be obtained from the cathode of the audio output tube so a 1500Ω resistor was added from the 245 volt source to obtain the 130 volts. The partial schematic in Fig. 3 shows the revised power supply circuit.

A 6AL5 tube was also added for AGC clamper since the 6AV6, whose diodes were formerly used for this purpose, is not included in the revised audio circuit. The circuit using the 6AL5 is identical to the one using the 6AV6, with the plate (pin 2) of the 6AL5 connected to the junction of C88, R49, R50 and R60 and the cathode (pin 5) grounded.

Ch. 300-17, 300-21, 375-21

NEW TUNER

A straight VHF tuner (part #9786) is used in Ch. 375-21 and all Ch. 300-17 and 300-21 without the "U" suffix in the model number. A schematic of this tuner is given in Fig. 4. Alignment instructions for this tuner are also given in this bulletin.

PRODUCTION CHANGES
BULLETIN 108

PRODUCTION CHANGES
BULLETIN 108

AM ALIGNMENT

Turn AM-TV-Phono switch to AM position.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
17.	.1MFD	High side to pin 1 (grid) of 6BE6. Low side to chassis.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A47, A48 A49, A50	Adjust for maximum output.
18.		Loop	1620KC	"	"	A51	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
19.		"	1400KC	Tune to 1400KC signal	"	A52	"
20.		"	600KC	"	"		Spread or compress antenna rotor plates for maximum output.

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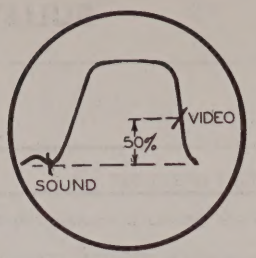

FIG.6

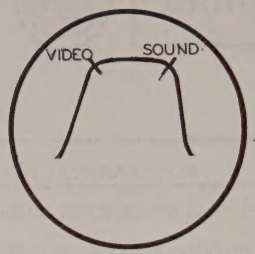

FIG.7

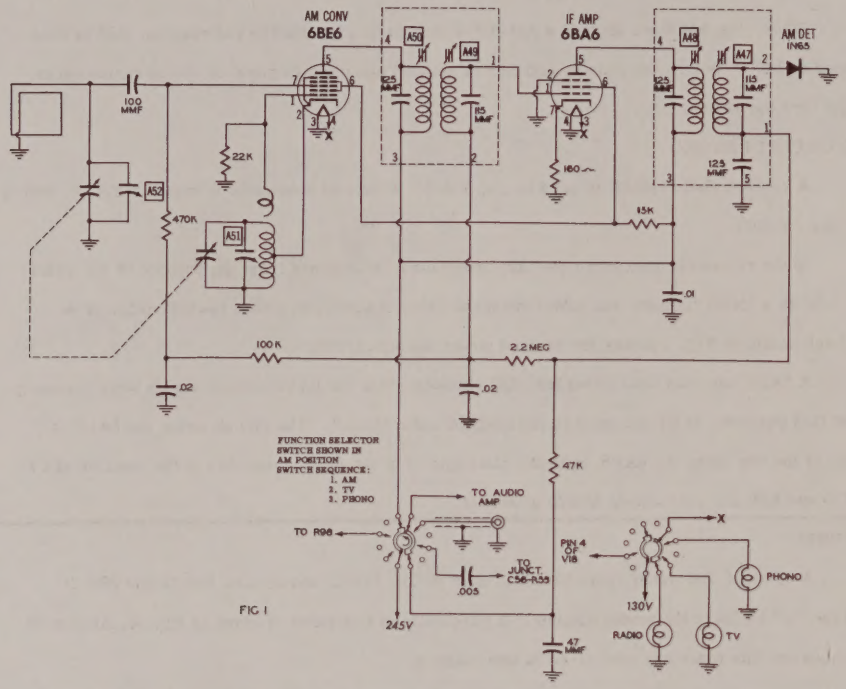

FIG 1

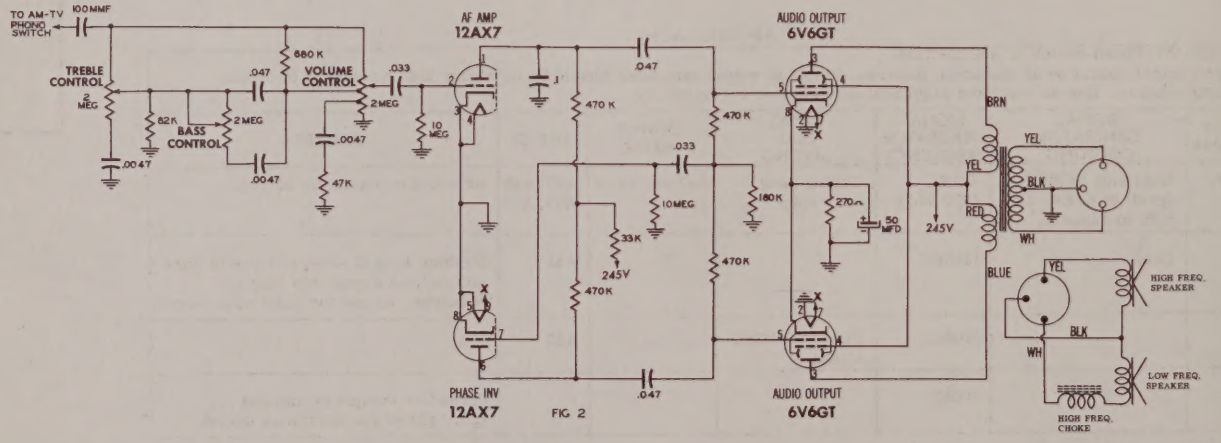

FIG 2

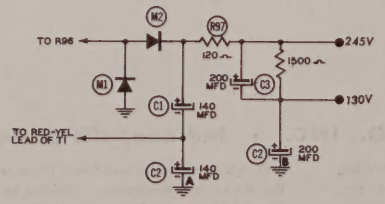

FIG 3

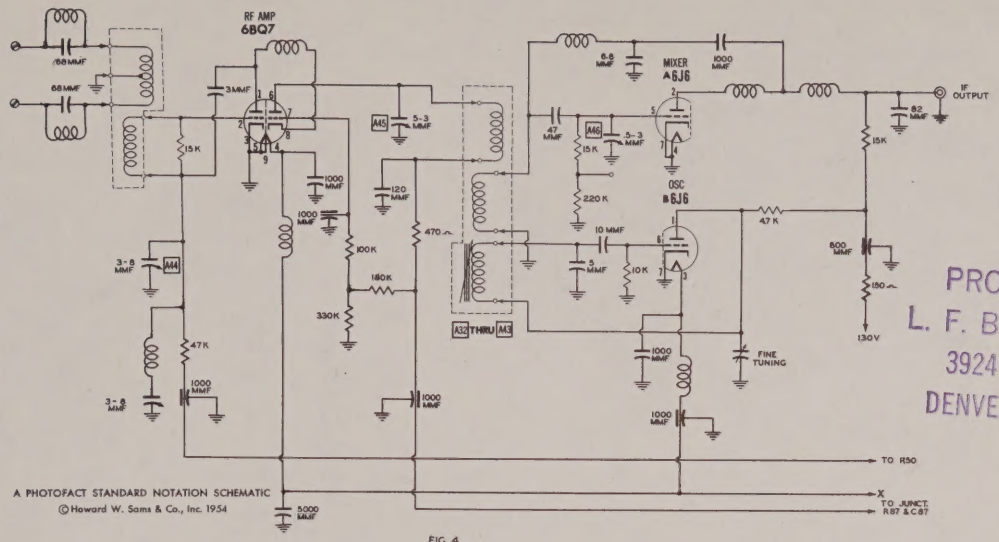

FIG 4

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ALIGNMENT INSTRUCTIONS

OSCILLATOR ALIGNMENT

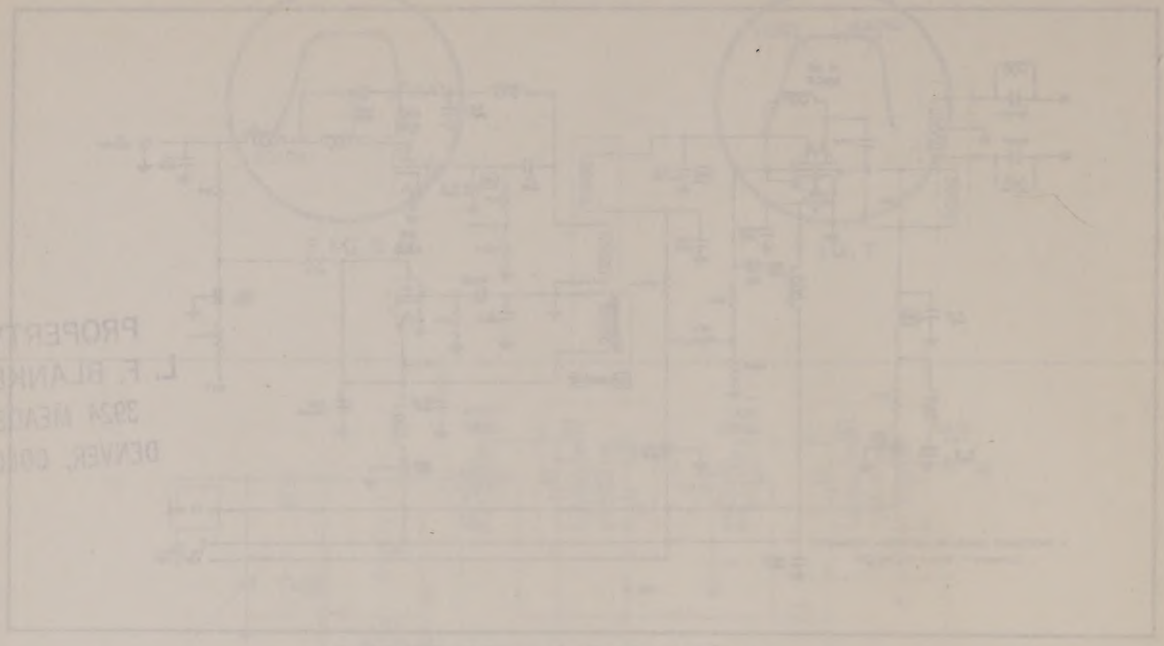
Replace V3 tube shield to its original position.
The channel oscillator adjustment screws are reached thru a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Leave bias connected as under "Video IF Alignment" and connect a jumper from the ungrounded side of C89 to the tuner AGC terminal.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A32	Adjust to place sound marker in trap notch as in Fig. 6. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A33	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A34	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A35	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A36	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A37	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A38	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A39	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A40	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A41	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A42	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A43	

RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
15.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A44 A45 A46	Adjust for response curve similar to Fig. 7 with markers above 90%.
16.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 7. If markers fall below 70% on any channel make slight compromise adjustments of A44, A45, and A46 with channel switch set to that channel, then check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			



PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

ADMIRAL
CHASSIS 20A2, 20A2Z, 20D2

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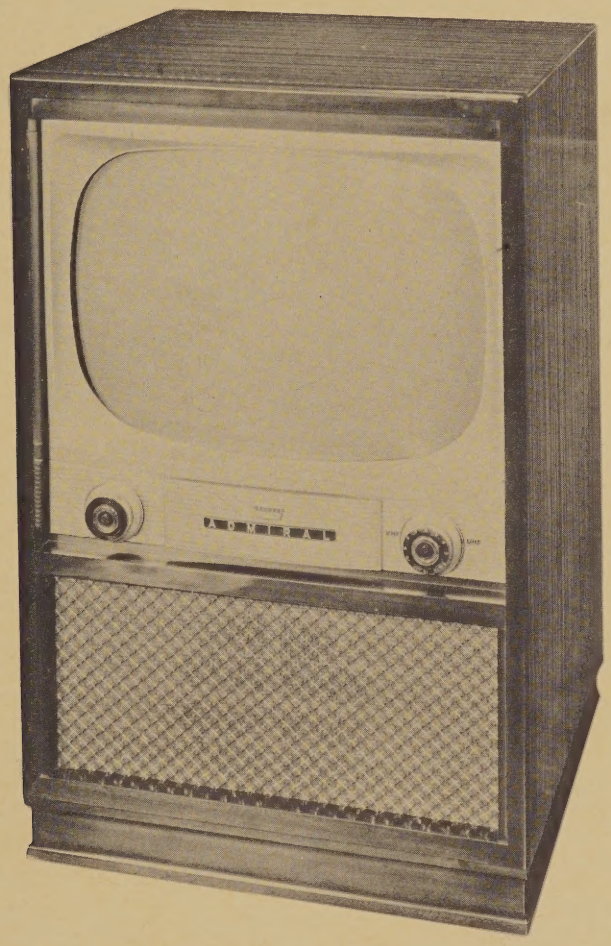

MODEL C2236A

ADMIRAL
CHASSIS 20A2, 20A2Z, 20D2

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DATE 11–54 SET 256 FOLDER 2

PHOTOFACT* Folder

*TRADE MARK

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CHASSIS 20A2, 20A2Z, 20D2

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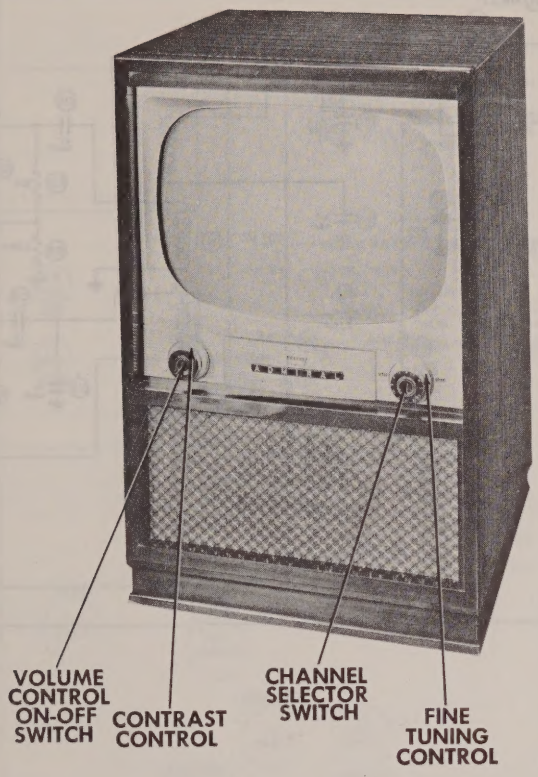

ADMIRAL MODEL C2236A

TRADE NAME	Admiral	MODELS	CHASSIS
		C2216AZ	20A2Z
		C2236A, F2226, T2216A, T2217A	20A2
		K2216A, K2217A	20D2 (Includes two tube built-in radio)
MANUFACTURER	Admiral Corp., 3800 W. Cortland St., Chicago 47, Ill.		
TYPE SET	Television Receiver		
TUBES	Twenty		
POWER SUPPLY	110-120 Volts AC-60 Cycle	RATING 1.52 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13, Video IF 25.75MC, Sound IF 21.25MC (Intercarrier)		

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FOR SERVICE INFORMATION ON RECORD CHANGER MODEL RC600, USED IN CHASSIS 20D2, SEE PHOTOFACT SET 218. FOLDER 2, ALSO SEE RECORD CHANGER MANUAL CM-5

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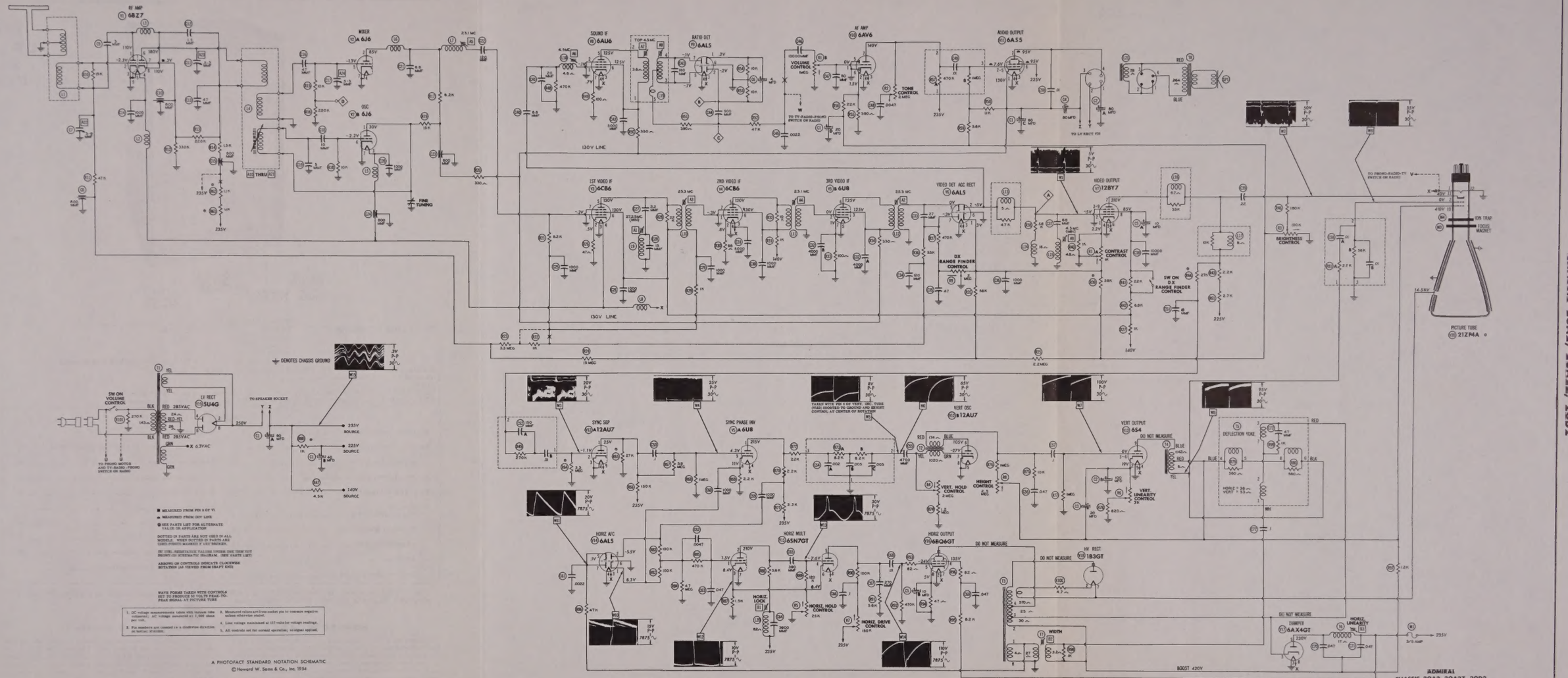
DATE 11-54 SET 256 FOLDER 2

ADMIRAL
CHASSIS 20A2, 20A2Z, 20D2



ADMIRAL
CHASSIS 20A2, 20A2Z, 20D2

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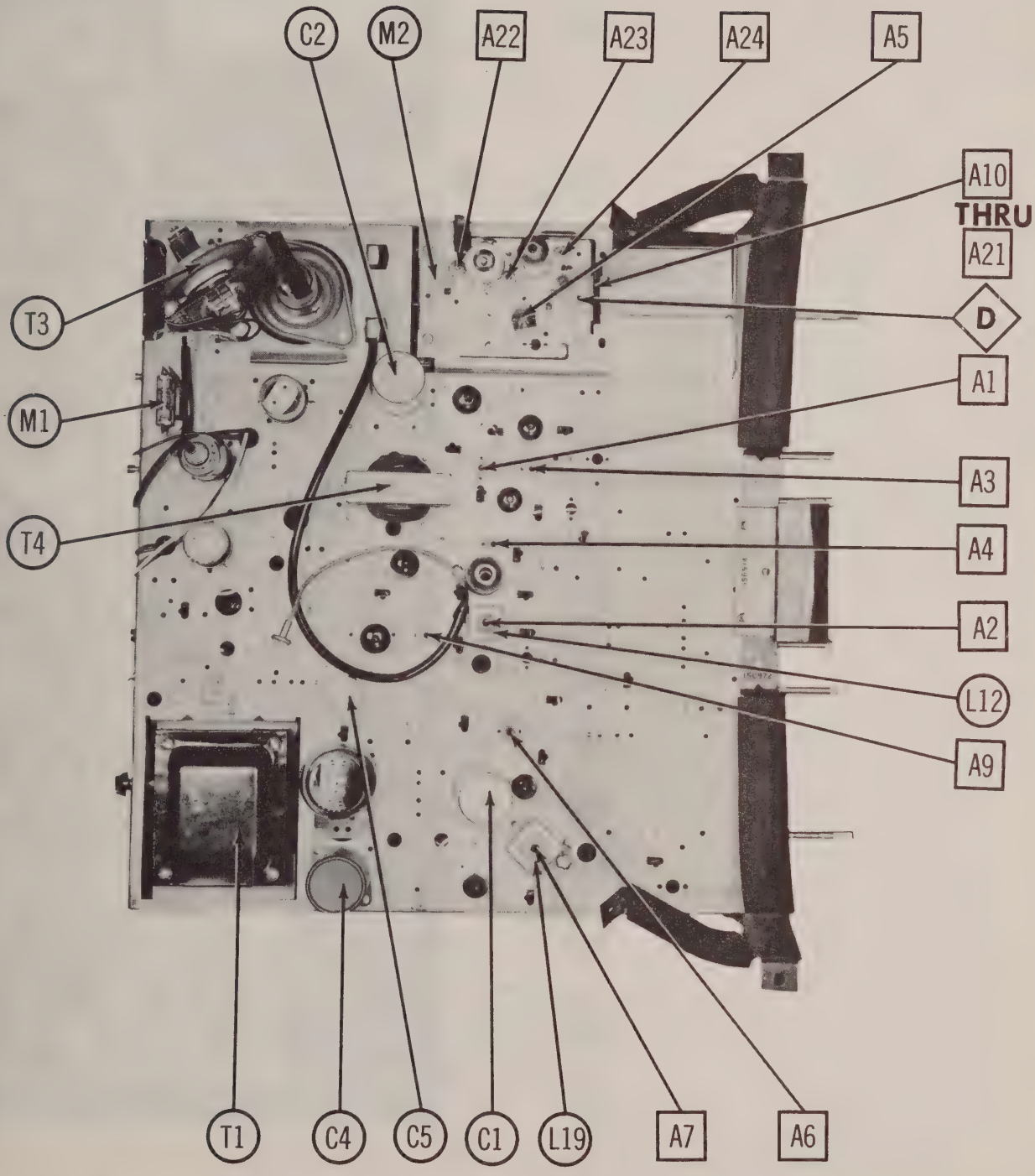

CHASSIS TOP VIEW

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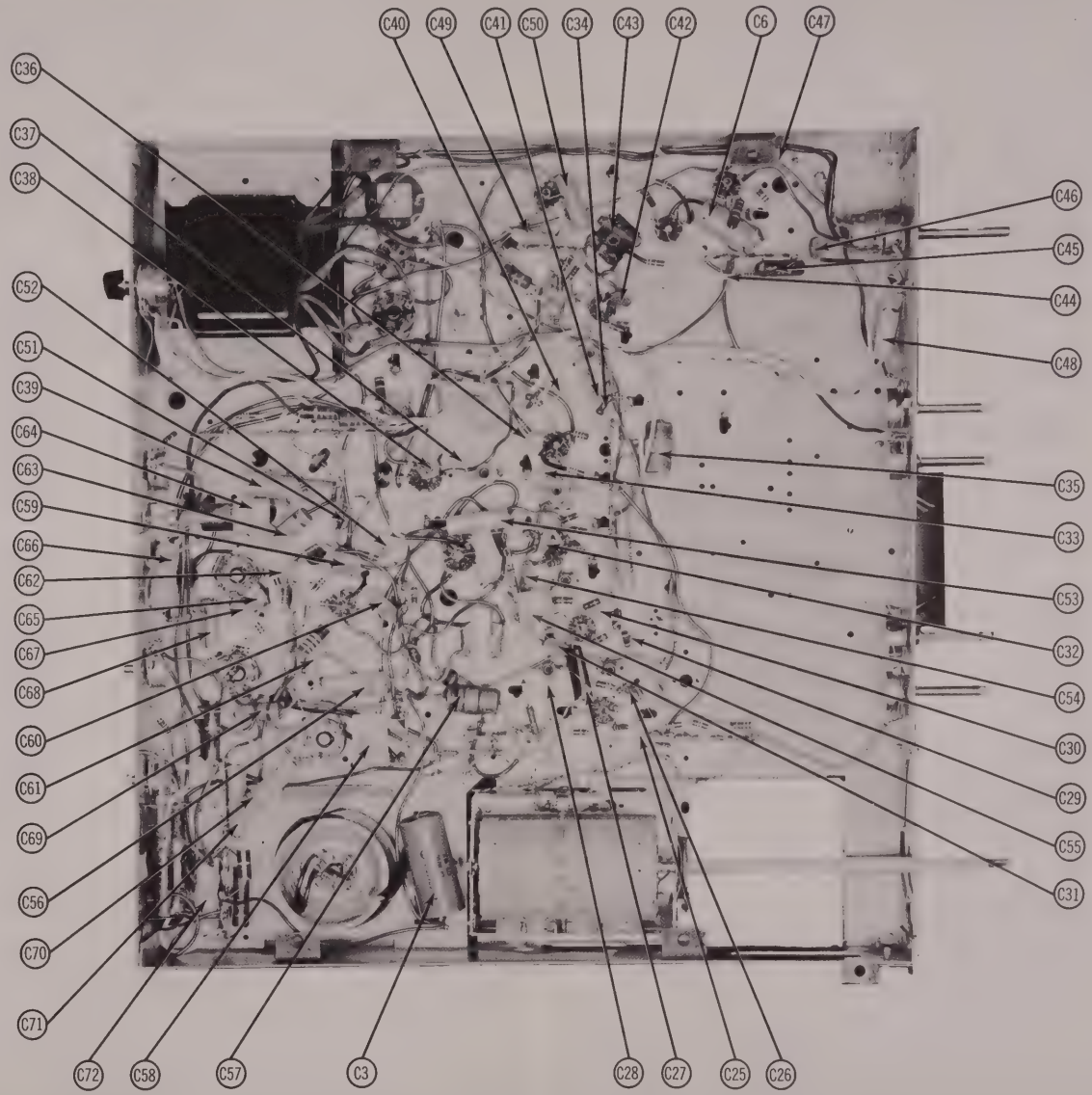

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART

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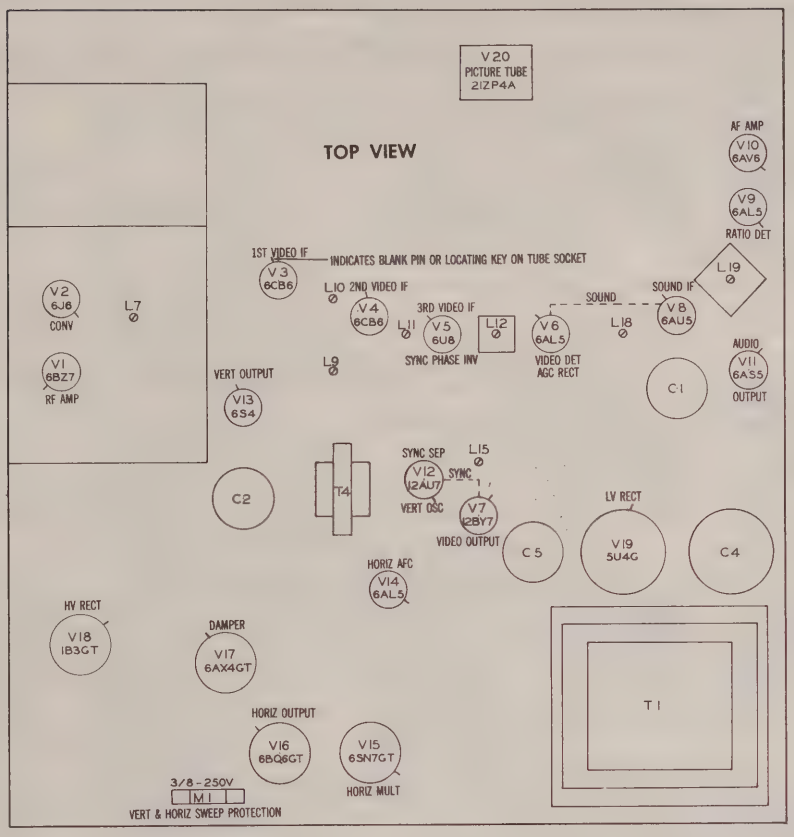

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V19

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6, V11
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V7, V20
Has pic, no sound - V8, V9, V10, V11

SYNC FAILURE
No vert. sync - V5, V12
No horiz. sync - V5, V14, V15
No vert. or horiz. sync -V5, V12

SWEEP FAILURE
No raster, has sound - V15, V16, V17, V18, V20, Fuse (M1)
No vertical deflection - V12, V13
Poor vert. linearity or foldover -V12, V13
Poor horiz. linearity or foldover - V15, V16, V17
Narrow picture - V15, V16, V17, V18, V19
Vert. off freq. - V5 V12
Horiz. off freq. - V5, V14, V15

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securety taped and kept away from the chassis.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) from its socket and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect the negative lead of a 4.5 volt bias supply to the ungrounded side of C25. Connect the positive lead to chassis.
Set the contrast control for minimum contrast. Disconnect antenna and short antenna terminals with a short jumper.
Use only enough generator output to provide a usable indication on VTVM (1 Volt max.).

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to tuner chassis.	27.25MC (Unmod.)	Any unused high band channel	DC probe thru decoupling filter (Fig.1) to point Ⓐ. Common to chassis.	A1	Adjust for MINIMUM deflection.
2.	"	"	25.3MC	"	"	A2, A3	Adjust for maximum deflection.
3.	"	"	23.1MC	"	"	A4, A5	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Leave bias battery connected as under "Video IF Alignment".
Use only enough sweep generator output to provide usable indication on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.25MC 22.0MC 24.3MC 25.75MC 27.25MC	Any unused high band channel	Vert. Amp. thru decoupling filter (Fig.1) to point Ⓐ. Low side to chassis.		Check for response curve similar to Fig.2. If necessary, retouch A1 thru A5 to obtain desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
5.	.01MFD	High side to pin 2 (plate) of 6AL5 (V6). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point Ⓑ. Common to chassis.	A6, A7	Attenuate generator output to maintain 1 volt at VTVM. Adjust for maximum deflection.
6.	"	"	"	"	DC probe to point Ⓒ. Common to chassis.	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	.01MFD	High side to pin 2 (plate) of 6AL5 (V6). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point Ⓑ. Low side to chassis.	A6, A7	Disconnect stabilizing capacitor C6. Adjust for curve of maximum amplitude and symmetry similar to Fig. 3.
6.	"	"	"	"	"	Vert. Amp. to point Ⓒ. Low side to chassis.	A8	Reconnect stabilizing capacitor C6. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.

SOUND IF ALIGNMENT USING ON THE AIR SIGNAL

Remove bias battery and replace original 6J6 in its socket. Tune in a TV station. Adjust A6, A7 with VTVM connected as in Step 5 of "Sound IF Alignment using AM Signal Generator and VTVM". Adjust A8 for best program sound with minimum buzz. This point will be found between two maximum buzz peaks.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.01MFD	High side to pin 2 (plate) of 6AL5 (V6). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point Ⓑ. Common to chassis.	A9	Connect a 10MMF capacitor from pin 7 (plate) of 12BY7 (V7) to pin 7 (cathode) of 6AU6 (V8). Use lowest scale on VTVM and adjust for MINIMUM deflection.

ALTERNATE 4.5 MC TRAP ALIGNMENT

Tune in a TV station and adjust A9 for minimum 4.5MC beat interference in the picture.

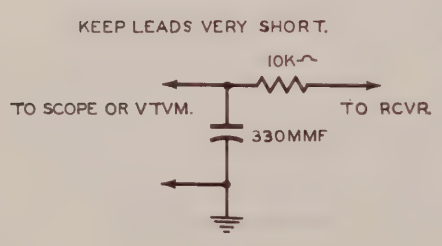

FIG.1

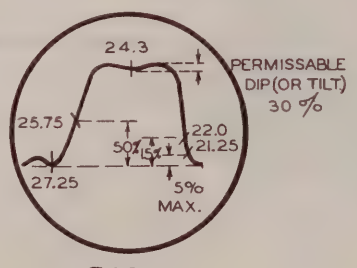

FIG.2

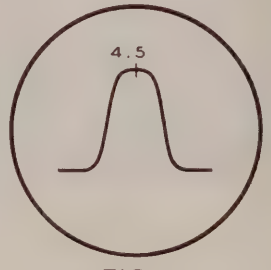

FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket. The channel oscillator adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Leave the bias battery connected as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru decoupling filter (Fig.1) to point (A). Low side to chassis.	A10	Adjust to place video marker at 50% as in Fig. 5. Sound marker should not exceed 5% on response curve.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A11	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A12	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A13	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A14	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A15	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A16	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A17	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A18	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A19	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A20	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A21	

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RF AND MIXER ALIGNMENT

Leave bias connected as under "Video IF Alignment". The bias supply may be removed if it is difficulat to obtain a response of sufficient amplitude. If the bias is removed connect the ungrounded side fof C25 to chassis with a short jumper.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert.Amp.thru 10KΩ to point (D). Low side to tuner chassis.	A22,A23, A24	Adjust for response curve similar to Fig. 6 with markers above 90%.
10.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 6. If markers fall below 70% on any channel make slight compromise adjustments of A22, A23 and A24 with channel switch set to that channel. Recheck all other channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

RADIO ALIGNMENT

Turn function switch to "Radio" position turn tone control fully clockwise.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
11.	.1MFD	High side to antenna stator lug on tuning gang. Low side to chassis.	455KC (400~Mod)	Radio	Tuning gang fully open	Across voice coil	A25, A26 A27,A28	Adjust for maximum output.
12.	"	"	1620KC	"	"	"	A29	"
13.	"	Loop	1400KC	"	Tune to 1400KC signal	"	A30	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

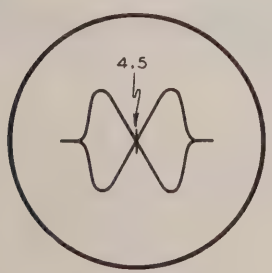


FIG. 4

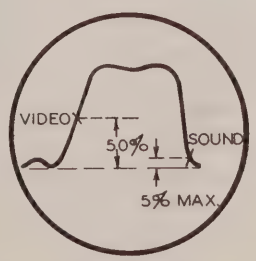


FIG. 5

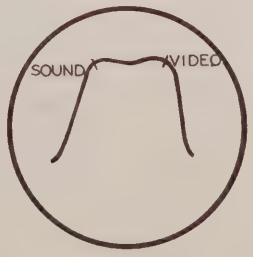
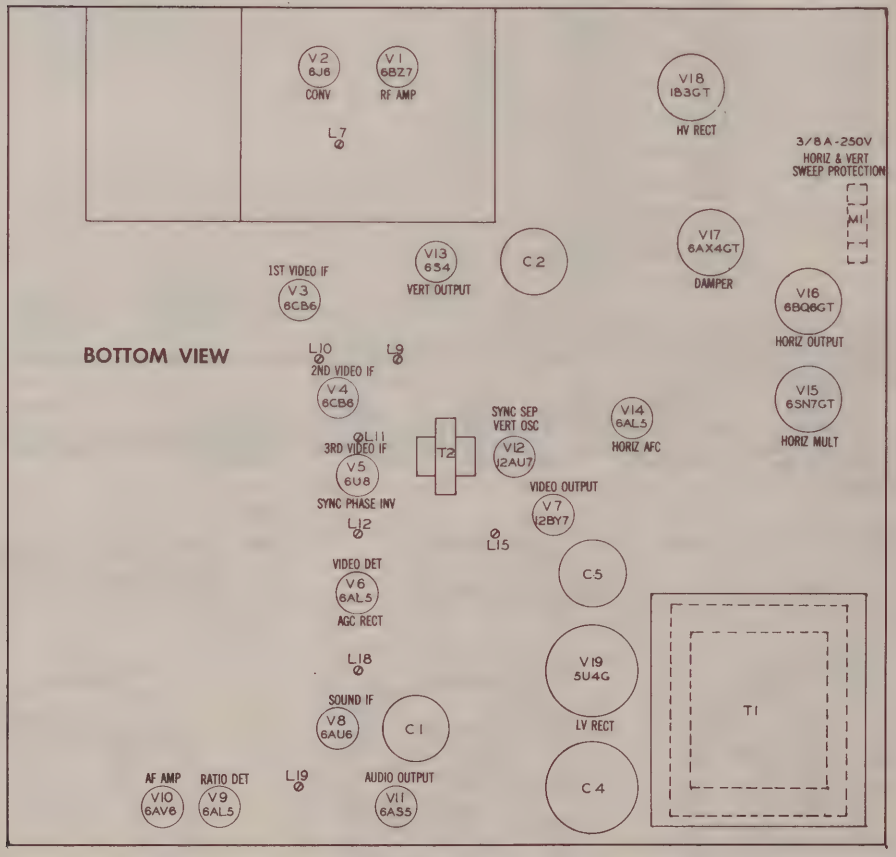


FIG. 6

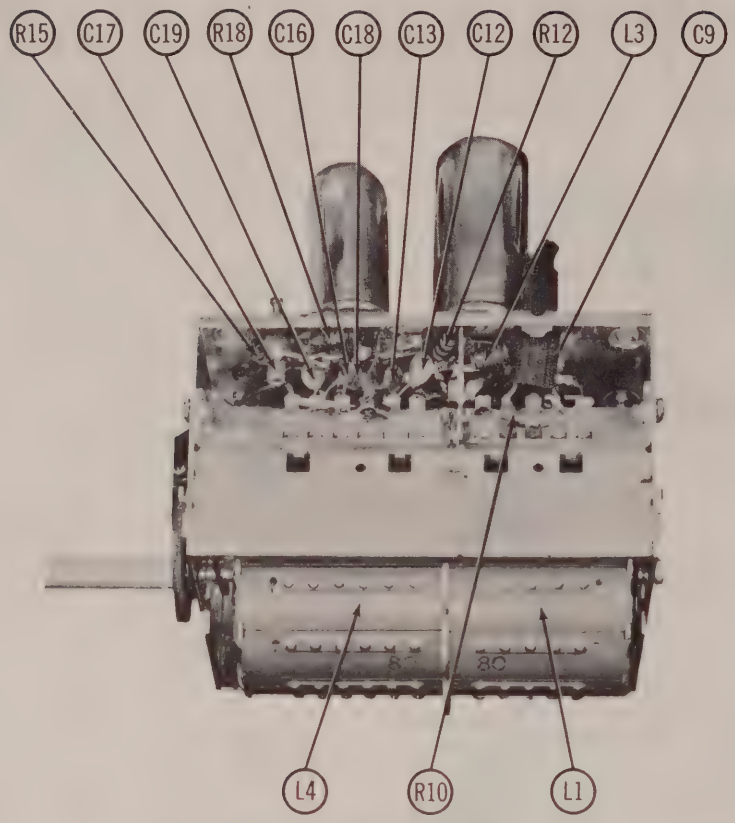
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	INF.	4 Meg	0Ω	.1Ω	0Ω	† 3.8KΩ	100KΩ	INF.	0Ω
V 2	6J6	▬ 15.3KΩ	▬ 8.5KΩ	.1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 3	6CB6	1.6Meg	47Ω	0Ω	.1Ω	† 5.5KΩ	† 5.5KΩ	0Ω		
V 4	6CB6	1.6Meg	68Ω	.1Ω	0Ω	† 5.5KΩ	† 5.5KΩ	0Ω		
V 5	6U8	† 4.4KΩ	.4Ω	▬ 330Ω	.1Ω	0Ω	▬ 330Ω	100Ω	2.2KΩ	1 Meg
V 6	6AL5	600Ω	5.6KΩ	.1Ω	0Ω	.4Ω	0Ω	1.3Meg		
V 7	12B47	500Ω	5.6KΩ	0Ω	0Ω	0Ω	.1Ω	† 5.7KΩ	40KΩ	0Ω
V 8	6AU6	470KΩ	0Ω	.1Ω	0Ω	▬ 330Ω	▬ 330Ω	100Ω		
V 9	6AL5	10KΩ	10KΩ	.1Ω	0Ω	INF.	0Ω	INF.		
V 10	6AV6	650KΩ	390Ω	.1Ω	0Ω	0Ω	0Ω	† 470KΩ		
V 11	6AS5	27KΩ	1 Meg	.1Ω	0Ω	1 Meg	† 1KΩ	† 300Ω		
V 12	12AU7	† 30KΩ	3.3Meg	0Ω	0Ω	0Ω	▲ 3.7Meg	2.5Meg	0Ω	.1Ω
V 13	6S4	INF.	1.4KΩ	1 Meg	.1Ω	0Ω	1 Meg	INF.	INF.	▲ 2.5KΩ
V 14	6AL5	4.8Meg	4.8Meg	.1Ω	0Ω	47KΩ	0Ω	47KΩ		
V 15	6SN7GT	5.2Meg	† 5.7KΩ	1.5KΩ	160KΩ	† 170KΩ	1.5KΩ	0Ω	.1Ω	
V 16	6BQ6GT	† 8.2KΩ	0Ω	470KΩ	† 8.3KΩ	470KΩ	INF.	.1Ω	47Ω	TOP CAP ▲ 25Ω
V 17	6AX4GT	INF.	INF.	300KΩ	INF.	† 100Ω	INF.	0Ω	.1Ω	
V 18	1B3GT	PINS 1-8 HAVE INF. RESISTANCE								TOP CAP ▲ 595Ω
V 19	5U4G	INF.	30KΩ	INF.	24Ω	INF.	26Ω	INF.	30KΩ	
V 20	21ZP4A	.1Ω	56KΩ	PIN 10 ▲1.4KΩ	PIN 11 ▬ 250KΩ	PIN 12 0Ω				

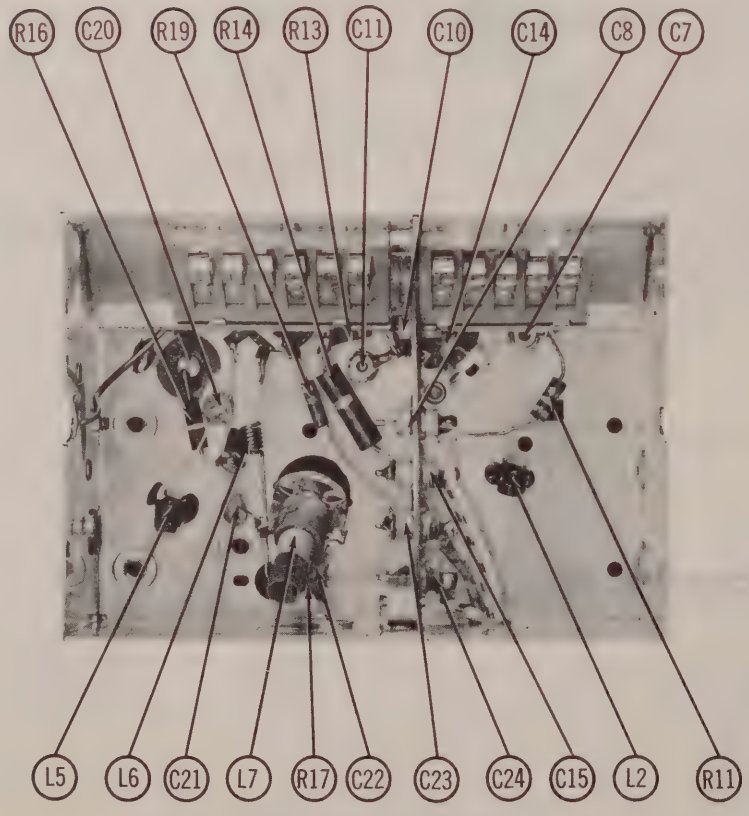
† MEASURED FROM PIN 8 OF V19.
▬ MEASURED FROM 130V LINE.
▲ MEASURED FROM PIN 3 OF V17.



TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW

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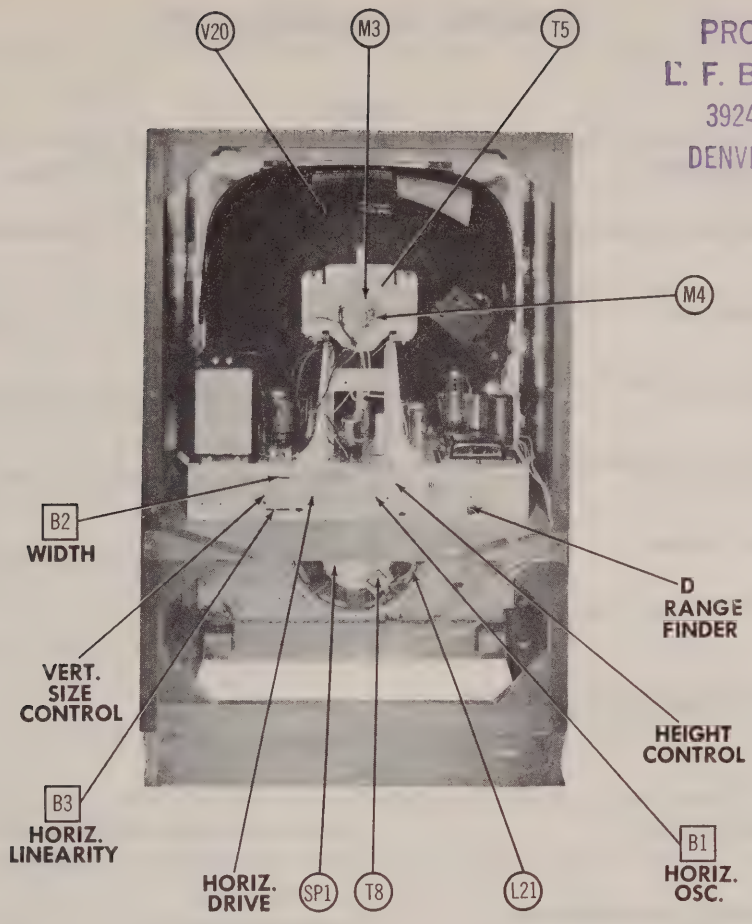


CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

1. Turn the set on and tune in a TV station, preferably a test pattern.

Set the DX range finder control as near the "zero" position as possible consistent with satisfactory pictures.

2. Set the brightness control below average setting. Turn the contrast control and the horizontal hold control fully counter clockwise.

3. Turn the horizontal drive control fully clockwise.

4. Turn the horizontal lock slug (B1) clockwise until the picture loses sync. It may be necessary to switch off channel momentairly for picture to lose sync.

5. Turn B1 slowly counter clockwise until picture just falls into sync.

6. Switch to an unused channel. If vertical white lines appear near the center of the screen slowly rotate the horizontal drive control counter clockwise until the white lines just disappear.

7. If in step 6 the horizontal drive control was readjusted tune in a station and repeat steps 4 and 5.

8. To check for satisfactory operation slowly rotate the horizontal hold control in either direction while interrupting the signal by switching off channel and then back. The picture should fall into sync through at least half of the range of the horizontal hold control.

Adjust the width slug (B2) for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the linearity slug (B3) for a picture that is symmetrical from left to right.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V16, V17, and V19. Check B2 and B3. Check T3, T5A, R95, C69 and other associated components.

DRIVE LINES

Check by substitution V16 and V17. Check B3 and R7. Check R95, R91, C68, T3, T5B and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V16 and V17. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V15 and V16. Check C63 for open. Check other associated components.

XMAS TREE EFFECT

Check by substitution V15, V16 and V17. Check T3 and T5A for internal arcing. Check L20, C60, C65, R88, R90 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V12 and V13. Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T4, T5B, C3, R78 and other associated components.	Check T2, R97, R8, R76, C57, C55 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V12 and V13. Check height and vertical linearity controls for proper operation. Check T4 and T5B.

COMPRESSED AT BOTTOM

Check by substitution V12 and V13. Check R97, R8, R76, T2 and other associated components.

COMPRESSED AT TOP

Check by substitution V12 and V13. Check C57, R6, R78, C3, C2B and other associated components.

FOLDS

Check by substitution V12 and V13. Check R78, R75, C56 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V12 and V5. Check C52B, C53, R66, R71, R70 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Check by substitution V12. Check T2, R74, R4 and C55. Check vertical integrator network. Check video IF alignment for overloading.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V14 and V15. Check waveform W12.

If Satisfactory	If Unsatisfactory
Check L20, C65, R89, R5, C64 and other associated components.	Check horizontal AFC network for component failure or change of value.

HORIZONTAL BENDING

Check by substitution V5, V12, V14 and V15. Check AGC network.

VIDEO

LOSS OF VIDEO

Substitute V7. Check L16, L17, R41, R42, C38, C39 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check video IF alignment. Check adjustment A9.

POOR CONTRAST

Substitute V7. Check AGC network. Check video detector network. Check contrast control, picture tube and other components associated with V7.

NEGATIVE PICTURE

Substitute V7. Check video detector network. Check picture tube and other associated components.

SMEAR

Substitute V7. Check L13, L14, L16, L17, C39, and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9, V10 and V11. Check stages V10 and V11 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF for components failure or change of value.	Check C49, C50, C4, R61, R60 T8, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A8 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

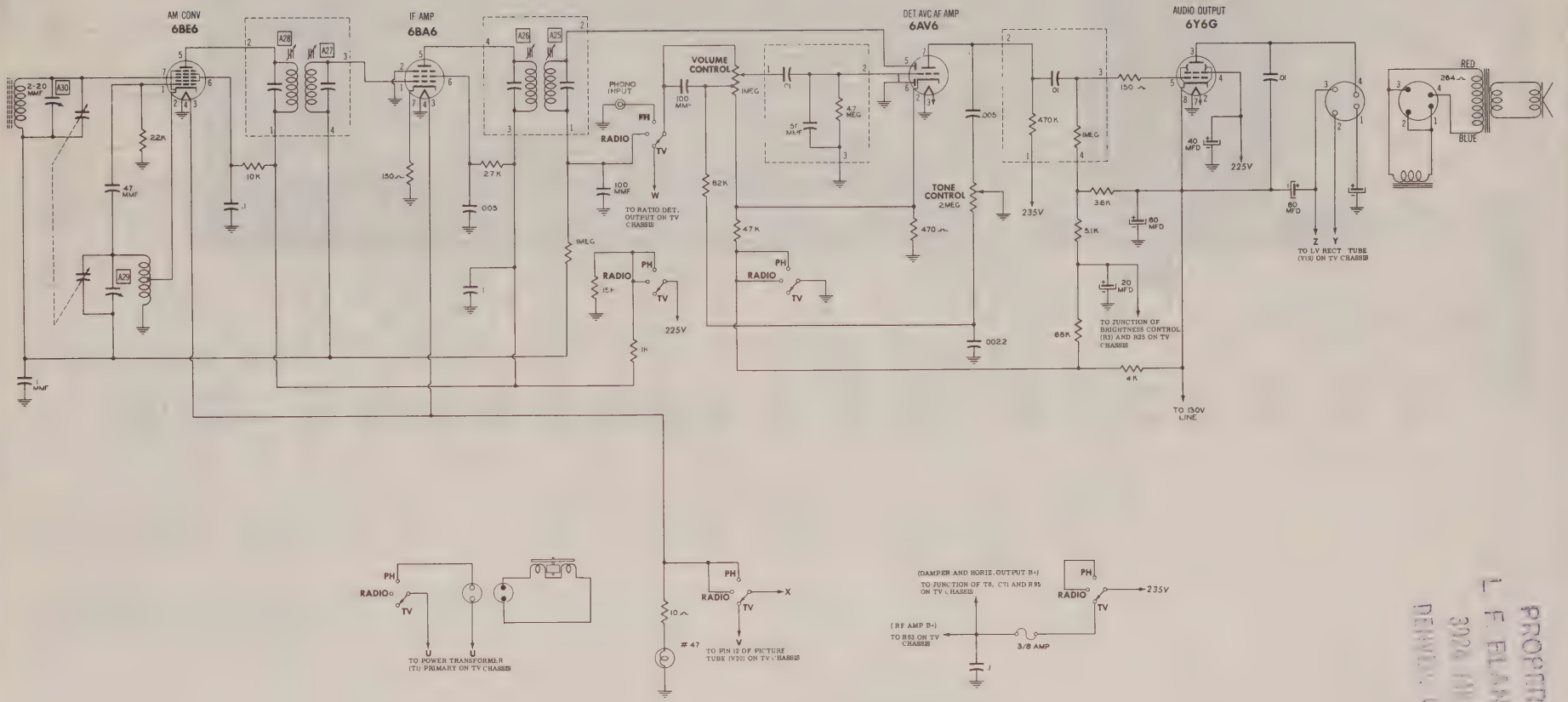
POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V19. Check speaker cable. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V19. Check B+ filter and decoupling network.



AM RADIO AND AUDIO AMPLIFIER USED ON CHASSIS 20D2

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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RADIO SCHEMATIC

ADMIRAL
CHASSIS 20A2, 20A2Z, 20D2

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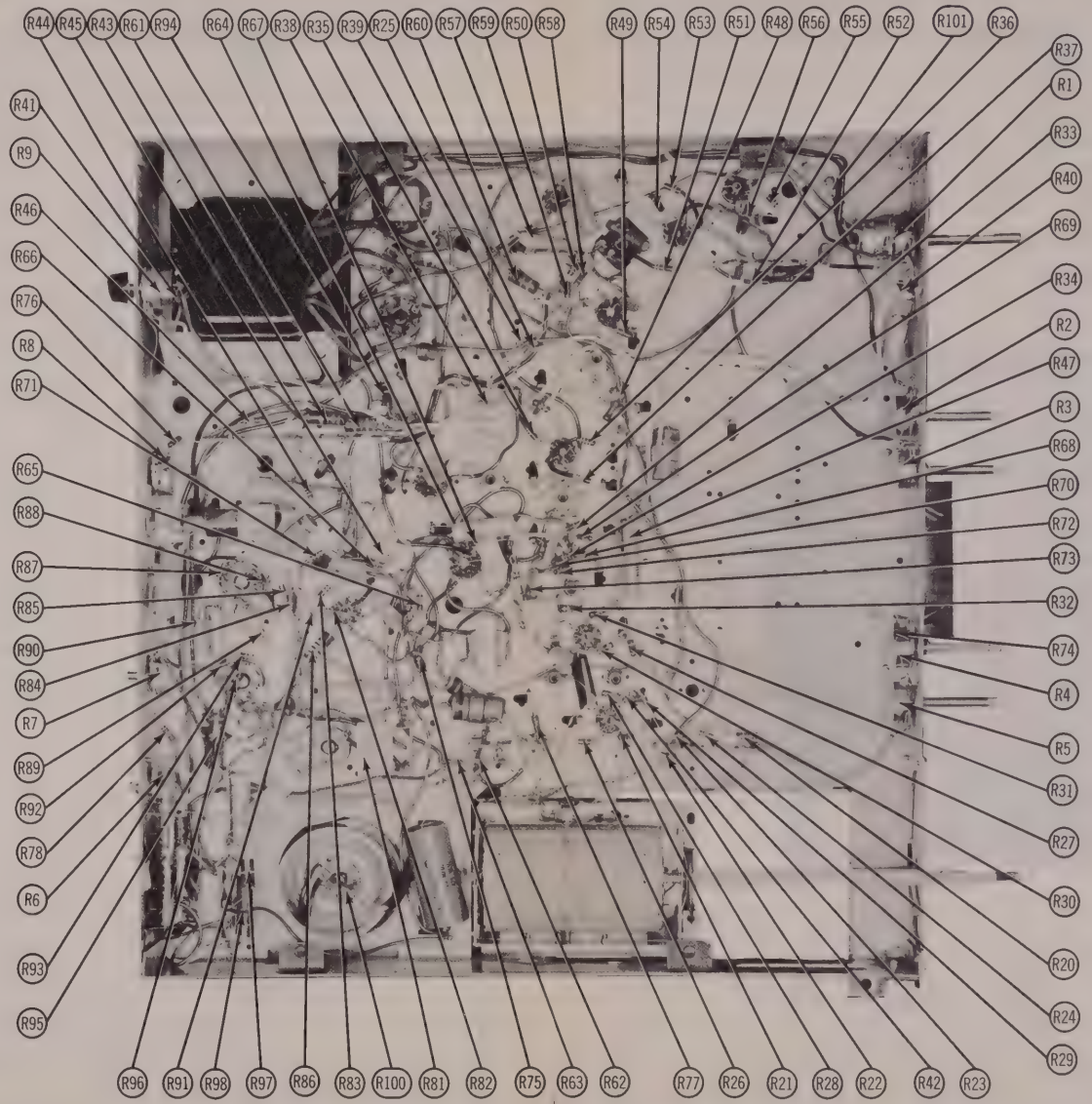

CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: ADMIRAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Converter	6J6	6J6	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.-Sync Phase Inv.	6U8	6U8	9AE	
V6	Video Detector-AGC Rectifier	6AL5	6AL5	6BT	
V7	Video Output	12BY7	12BY7	9BF	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Det.	6AL5	6AL5	6BT	
V10	AF Amp.	6AV6	6AV6	7BT	
V11	Audio Output	6AS5	6AS5	7CV	
V12	Sync Separator-Vert. Osc.	12AU7	12AU7	9A	
V13	Vert. Output	6S4	6S4	9AC	
V14	Horiz. AFC	6AL5	6AL5	6BT	
V15	Horiz. Mult.	6SN7GT	6SN7GT	8BD	
V16	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V17	Damper	6AX4GT	6AX4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	
V19	LV Rectifier	5U4G	5U4G	5T	

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CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: ADMIRAL PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V20	21ZP4A 21ZP4B	21ZP4A 21ZP4B	21ZP4A 21ZP4B	21ZP4A 21ZP4B 21ZP4 ①	21ZP4A 21ZP4B	12N 12N 12D	① Circuit changes necessary

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ADMIRAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	▲60	350	67D15-23	AFH3-29		C023		FP419.66	TVL-4609	
B	■40	350		PRS350/30-30		BR6025				
C	▲60	200								
D	20	150								
C2A	▲80	350	67D15-22	AFH3-142		C109		FP375	TVL-3722	
B	▲100	50								
C3	20	475	67A25-1	PRS500/20		BR2050		TC83	TVA-1804	
C4	80	350	67C15-64	AFH1-42		XA011		FP138	TVL-1630	
C5A	■10	300	67D15-33	AFH2-31		B037		FP231	TVL-2565	
B	▲10	25								
C6	4	50	67A4-9	PRS150/4		BR550		TC30	TVA-1303	
C7	3-9		98A45-96		829-10					
C8	800		94C37-90							
C9	3		94D47-54	SI3NP0	TCZ-3		NP0K-030	ZT-5533	5TCCB-V33	
C10	800		94C37-90							
C11	.5-3		98A45-23		829-3		3115-01-0R5	CT565A		
C12	1.5		94D46-84	SI1.5NP0	TCZ-1.5	Z004	NP0K-1R5	ZT-5515	5TCCB-V15	
C13	47		94D47-50	BPD-000047	D6-470	G033	801-470	UC-5447	5GA-Q47	
C14	1000		98A45-24	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C15	800		94C37-90							
C16	47		94D47-50	BPD-000047	D6-470	G033	801-470	UC-5447	5GA-Q47	
C17	.5-3		98A45-23		829-3		3115-01-0R5	CT565A		
C18	10		98A45-64	SI10NP0	TCZ-10	Z018	NP0K-100	ZT-541	5TCC-Q1	
C19	5		94D47-52							
C20	1000		98A45-24	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C21	6.8		94D47-53	SI6.8NP0	TCZ-6.8	Z013	NP0K-6R8	ZT-5568	5TCCB-V68	
C22	120		98A45-78	BPD-00012	D6-121	G044	801-121	UC-5312	5GA-T12	
C23	800		94C37-90							
C24	800		94C37-90							
C25	1000		65C6-41	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C26	1000		65C6-41	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C27	2.2		65C6-86	SI2.2NP0	TCZ-2.2	Z006	NP0K-2R2		5TCCB-V22	
C28	15		65C6-50	SI15NP0	TCZ-15	Z021	NP0K-150		5TCC-Q15	
C29	1000		65C6-41	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C30	1000		65C6-41	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C31	5000		65C10-1	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C32A	4000		65A17-1	BPD-2X004	D6-402	DK078	822-004	DCD-524	5HK-2D4	
B	4000				D6-402					
C33	27		65C6-87	SI27	D6-270	G027	GP1K-270	UC-5427	5GA-Q27	
C34	120		65C6-66	SI120	D6-121	TP35	GP2K-121	UC-5312	5GA-T12	
C35	.47	100	64A10-1	P288-47		CUB2P47		PT4147	2TM-P47	
C36	1000		65C6-41	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C37	6.8		65C6-71	SI6.8NP0	TCZ-6.8	Z013	NP0K-6R8	ZT-5568	5TCCB-V68	
C38	10000		65C10-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C39	.22	400	64B9-24	P488-22		CUB4P22		PT4022	4TM-P22	
C40	6.8		65C6-71	SI6.8NP0	TCZ-6.8	Z013	NP0K-6R8	ZT-5568	5TCCB-V68	
C41	20		65C6-51	SI20NP0	TCZ-20	Z023	NP0K-200	ZT-542	5TCC-Q2	
C42	5000		65C10-1	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C43	180		65C6-59							
C44	500		65C6-6	SI500	D6-501	TP47	GP2K-501	UC-535	5GA-T5	
C45	.0022	600	64B9-17	P688-0022	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C46	10000		64B8-13	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C47	50		65C6-4	SI50	D6-500	TP30	GP1K-500	UC-545	5GA-Q5	
C48	.0047	600	64B9-15	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C49	.01		†63C6-5	†PA-139	DD-103	K082	811-01	DC-511	5HK-S1	
C50	.01	600	64B8-13	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C51	18	500	65B5-4	1469-200		22R5Q18			MS-42	
C52A	150		‡ 63C6-8	‡ PA-140	D6-151	TP36	GP2K-151	UC-5315	5GA-T15	
B	.01				DD-103	K082	811-01	DC-511	5HK-S1	
C53	.1	200	64B9-39	P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C54A	.002					K072	801-002	DC-522	5HK-D2	
B	.005		♦63C6-11	♦PA-110-4	♦PC-105	K080	811-005	DC-525	5HK-D5	
C	.005					K080	811-005	DC-525	5HK-D5	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA ADMIRAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C55	4700	500	85B21-472	1464-472		IR5D47		MCB465	MB-26	
C56	.047	600	84A3-14							
C57	.1	600	84B9-7	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C58A	.01	}	*63C6-12	*PA-189	{ DD-103	K082	811-01	DC-511	5HK-31	
B	.01	}			{ DD-103	K082	811-01	DC-511	5HK-31	
C59	1000	500	85B21-102	1468-001	D6-102	1W5D1	GP2L-102	MC255	1FM-21	
C60	1000	500	85B21-102	1468-001	D6-102	1W5D1	GP2L-102	MC255	1FM-21	
C61	.0022	600	84B6-17	P688-0022	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C62	.0047	400	85B9-15	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C63	.047	400	84B9-38	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C64	3900	500		1464-392		IR5D39		MCE463	MB-24	
C65	390	500	85B21-391	1469-391		SR5T39		MCB243	MB-24	
C66	.1	600	84B9-75	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C67	270	500	85B21-271	1469-271		22R5T27		MCB241	MB-23	
C68	.01	600	85C10-3	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C69	.047	400	84B9-38	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C70	.047	600	84A2-14	P688-047		CUB6S47		PT6147	6TM-S47	
C71	.047	600	84A2-14	P688-047		CUB6S47		PT6147	6TM-S47	
C72	.1	600	84B9-36	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C73	47	1500	85B1-84	HVD15-470	DD30-470	MCQ47	IR6KV-470		20GA-Q47	

† Items C49, R57A, R57B are combined in one unit.
‡ Items C53A, C53B, R45 are combined in one unit.
• Items C54A, C54B, C54C, R73A, R73B are combined in one unit.
* Items C58A, C58B, R81A, R81B are combined in one unit.

CONTROLS

ITEM No.	RATING RESIST-ANCE	RATING WATTS	REPLACEMENT DATA ADMIRAL PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1000Ω	½	75B11-21	*QJ-397	B7Y-395	SBB-733-S	UF15L } †	Contrast-Panel
B	1Meg	2					UR16A } †	Volume - Rear
C	Switch						UR-26	Attach to R1B
R2A	2Meg	½	75C13-32	Q11-139	A47-2Meg-S	AB-75	U-58	Tone
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R2A
R3A	100KΩ	½	75C13-25	Q11-128	A47-100K-S	AB-40	U-41	Brightness
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R3A
R4A	2Meg	½	75C13-32	Q11-139	A47-2Meg-S	AB-75	U-58	Vert. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R4A
R5A	25KΩ	½	75B13-26	Q11-120 ‡	A47-25K-S	B-26	U-39	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	Not Req.	Not Req.	Attach to R5A
R6A	1000Ω	½	75C13-7	Q11-112	A47-1000-S	AB-8	U-8	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FK8-1/4	AK-1	Not Req.	Attach to R6A
R7A	150KΩ	½	75B13-29	Q11-129	A47-150K-S	AB-46	U-43	Horiz. Drive
B	Shaft		Not Req.	Not Req.	FK8-1/4	AK-1	Not Req.	Attach to R7A
R8A	2.5Meg	½	75B13-3	Q11-339	A47-2.5Meg-S	AB-83	SU-585	Height
B	Shaft		Not Req.	Not Req.	FK8-1/4	AK-1	Not Req.	Attach to R8A
R9A	2Meg	½	76C1-63	Q11-139	A47-2Meg-S	B-76-S	U-56	DX Range Finder
B	Shaft		Not Req.	Not Req.	KS8-3	Not Req.	Not Req.	Attach to R9A
C	Switch		Not Req.	76-1	SWK-12	Not Req.	UB-26	Attach to R9A

* CONCENTRIKIT EQUIVALENT KIT K-2 BASE ELEMENT & SHAFT B17-108 & P1-126 (Panel)
B13-137 & R2-212 (Rear) & SWITCH 76-L
† Universal Replacement (Mallory exact duplicate part #UE57B).

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ADMIRAL PART No.	IRC PART No.	NOTES
R10	15KΩ	½	98A45-87	BTS-15K	
R11	47KΩ	½	98A45-17	BTS-47K	
R12	330KΩ	½	98A45-134	BTS-330K	
R13	220KΩ	½	98A45-224	BTS-220K	
R14	1500Ω	1	60B14-152	BTA-1500	
R15	10KΩ	½	98A45-18	BTS-10K	
R16	220KΩ	½	98A45-21	BTS-220K	
R17	8200Ω 5%	½	60B8-822	BTS-8200 5%	
R18	10KΩ	½	98A45-18	BTS-10K	
R19	15KΩ	½	98A45-87	BTS-15K	
R20	330Ω	½	60B8-331	BTS-330	
R21	8200Ω 5%	½	60B7-822	BTS-8200 5%	
R22	1000Ω	½	60B8-102	BTS-1000	
R23	3.3Meg	½	60B8-335	BTS-3.3Meg	
R24	15Meg	½	60B8-156	BTS-15Meg	
R25	2.2Meg	½	60B8-225	BTS-2.2Meg	
R26	47Ω	½	60B28-45	BTS-47	
R27	1000Ω	½	60B8-102	BTS-1000	
R28	22KΩ	½	60B8-223	BTS-22K	
R29	1000Ω	½	60B8-102	BTS-1000	
R30	68Ω	½	60B8-28-44	BTS-68	
R31	1000Ω	½	60B8-102	BTS-1000	
R32	10KΩ 5%	½	60B7-103	BTS-10K 5%	
R33	100Ω	½	60B28-19	BTS-100	
R34	330Ω	½	60B8-331	BTS-330	
R35	56KΩ	½	60B8-563	BTS-56K	
R36	33KΩ	½	60B8-333	BTS-33K	
R37	470KΩ	½	60B8-474	BTS-470K	
R38	5600Ω	½	60B8-562	BTS-5600	
R39	56KΩ	½		BTS-56K	Note 1
R40	1000Ω	½	60B8-102	BTS-1000	
R41	33KΩ	½	60B8-333	BTS-33K	
R42	6800Ω	½	60B8-682	BTS-6800	
R43	2200Ω	2	60B20-222		
R44	27KΩ	½		BTS-27K	Note 2
R45	270KΩ	½	† 63C6-8	BTS-270K	
R46	180KΩ	½	60B8-184	BTS-180K	
R47	4500Ω	5	01A17-1		
R48	470KΩ	½	60B8-474	BTS-470K	
R49	100Ω	½	60B28-19	BTS-100	
R50	330Ω	½	60B8-331	BTS-330	
R51	390Ω	½	60B8-391	BTS-390	
R52	47KΩ	½	60B8-473	BTS-47K	
R53	10KΩ	½	60B8-103	BTS-10K	
R54	10KΩ	½	60B8-103	BTS-10K	
R55	390Ω	½	60B8-391	BTS-390	
R56	22KΩ	1	60B14-223	BTA-22K	
R57A	470KΩ	½	*63C6-5	BTS-470K	
B	1Meg	½		BTS-1Meg	
R58	1100 Ω 5%	½	60B7-112	BTS-1100 5%	
R59	3600Ω 5%	½	60B7-362	BTS-3600 5%	
R60	1000Ω	2	60B20-102	BTB-1000	Note 6
R61	2700Ω	2	60B20-272	BTB-2700	
R62	1100Ω 5%	½		BTS-1100 5%	Note 3
R63	1100Ω 5%	½		BTS-1100 5%	Note 3
R64	3.3Meg	½		BTS-3.3Meg	Note 4
R65	27KΩ	½		BTS-27K	Note 5
R66	150KΩ	½	60B8-154	BTS-150K	
R67	3.9Meg	½	60B8-395	BTS-3.9Meg	
R68	1Meg	½	60B8-105	BTS-1Meg	
R69	2200Ω	½	60B8-222	BTS-2200	
R70	2200Ω	½	60B8-222	BTS-2200	
R71	2200Ω	½	60B8-222	BTS-2200	
R72	22KΩ	½	60B8-223	BTS-22K	
R73A	8200Ω	½	*63C8-11	BTS-8200	
B	8200Ω	½		BTS-8200	
R74	1.2Meg	½	60B8-125	BTS-1.2Meg	
R75	10KΩ 5%	½	60B7-103	BTS-10K 5%	
R76	1Meg	½	60B8-105	BTS-1Meg	
R77	1Meg	½	60B8-105		
R78	820Ω	½	60B8-821	BTS-820	
R79	560Ω	½		BTS-560	
R80	560Ω	½		BTS-560	
R81A	2700Ω	½	*63C6-12	BTS-2700	
B	56KΩ	½		BTS-56K	
R82	100KΩ 5%	½	60B7-104	BTS-100K 5%	
R83	100KΩ 5%	½	60B7-104	BTS-100K	
R84	4.7Meg	½	60B8-475	BTS-4.7Meg	
R85	470KΩ	½	60B8-474	BTS-470K	
R86	47KΩ	3	60B20-473	BTB-47K	
R87	1500Ω	½	60B8-152	BTS-1500	
R88	5600Ω	½		BTS-5600	
R89	120KΩ	½	60B8-124	BTS-120K	
R90	100KΩ	½	60B8-104	BTS-100K	
R91	5600Ω	½	60B8-562	BTS-5600	
R92	470KΩ	½	60B8-474	BTS-470K	
R93	82Ω	½	60B38-31	BTS-82	
R94	47Ω	1	60B14-470		

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ADMIRAL PART No.	IRC PART No.	NOTES
R95	8200Ω	2	60B20-822	BTB-8200	
R96	82Ω	½	60B28-31	BTS-82	
R97	1200Ω	2	60B20-123	BTB-1200	
R98	1000Ω	2	60B20-102	BTB-1000	
R99	1000Ω	½		BTS-1000	
R100	4.7Ω	½	60B28-11		
R101	270KΩ	1	60B14-274	BTA-270K	

Note 1. Some versions may use a 33KΩ resistor in this application.
Note 2. Some versions may use a 18KΩ resistor in this application.
Note 3. Not used in some versions.
Note 4. Some version may use a 2.7 Meg. resistor in this application.
Note 5. Some versions may use a 47KΩ resistor in this application.
Note 6. Chassis 20D2 uses a 1200Ω 5 watt resistor in this application.
† Items C53A, C53B, R45 are combined in one unit.
† Items R57A, R57B, C49 are combined in one unit.
• Items R73A, R73B, C54A, C54B, C54C are combined in one unit.
* Items R81A, R81B, C58A, C58B are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA ADMIRAL PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC	550VCT	5VAC	80C35-1	P-8164	P-3077	R-61BC①		P9733	
	⑤ 1.52A	.220ADC	⑤ 3A				②			
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC ⑤ 9A									

① Drill new mounting holes.
② Tape 6.3V ⑤ 1.2A winding parallel and phase 6.3V ⑤ 6A windings for Sec. 3.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA ADMIRAL PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T2	Vert. Osc. Trans.	79A18-5	A-8125	A-3003	A-97X	209T1 ①	B6702	24A87 ①
T3	Horiz. Output Trans.	79D41-3	A-8135 *	HVO-23 *	D-32 * & WC-11 ②	232T1 * & 212R1 ②	FB41 * & RF800②	FLY-14 * & WC-20②
T4	Vert. Output Trans.	79B43-4	A-8123①	A-3037 ①	A-102X①	222T1 ①	Z1604 ①	26S82 ①
T5A	Yoke-Horiz. (30MH)	79B40-2 ③						
B	Vert. (40MH)	94C51-1	DY-11A	MDF-73	Y-22-1	222D1	DF605	Y-9
T6	Horiz. Linearity(1.5-10MH)	94A50-1	WC-9④	MWC-6①	WC-12①⑥	213R1 ④	RF800⑥⑦	WC-18④
T7	Width (1.2-1.1MH) (4-28MH)	94A49-2						

① Drill one new mounting hole.
② Drill new mounting holes.
③ Alternate vertical output transformer.
④ Drill new mounting hole or use original slider and core.
⑤ Connect to coded black and orange terminals.
⑥ Connect to coded blue and red terminals.
⑦ Connect to coded #3 and #4 terminals.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Stancor Replacement Connections	Merit Replacement Connections	Triad Replacement Connections	RCA Replacement Connections	Halldorson Replacement Connections	Thordarson Replacement Connections
	4	4	4	9	10	9	9
	3	3	3	8 & 1	8	8	8 & 7
	2	2	1	1	3	1	1
	8	6	6	WC-11 (orange term)	1	RF800 (#4 term)	WC-20 (#1 term)
	1	7	7	WC-11 (black term)	2	RF800 (#3 term)	WC-20 (#2 term)
Connect Width Coil Across →	8 & 1	6 & 7	6 & 7	WC-11 Red & Blue terminals T & 1	212R1 1 & 2	RF800 #1 & #2 term. T & 1	WC-20 #3 & #4 terminals T & 1
Special Notes →		①	②	③⑯	⑯	⑮ ⑯	③⑭

① If picture is out of phase, reverse AFC winding.
② If picture is out of phase, reverse primary or secondary of replacement width coil.
③ Remove original width coil and R99 from circuit. Connect yoke return to terminal #3.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA ADMIRAL PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T8	4.8KΩ	3Ω	79A8	A-3877 ①	A-2930 ①	S-3X ①	21107 ①	24851 ①	① Bend mounting tabs down. File out slots. Mount on original mounting bracket.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA ADMIRAL PART No.	VIKING PART No.	QUAM PART No.	NOTES
SP1	10"	PM	3Ω	78B90-1	10J11	10A31	① Used in models K2216A, and K2217A
	6"	PM	3Ω	78B76-2 ①	6J4	6A1	② Used in models T2216A, and T2217A
	5"	PM	3Ω	78B79-1 ②	5J4	5A1	③ Used in models C2216A2, C2236A, P2226, no filter choke used with this speaker.
	10"	75Ω	3Ω	78B75-1 ③			

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA ADMIRAL PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	Ant. Coil	0ΩCT	0Ω	94D46-52				Channel 2
B	Ant. Coil	0ΩCT	0Ω	94D46-53				Channel 3
C	Ant. Coil	0ΩCT	0Ω	94D46-54				Channel 4
D	Ant. Coil	0ΩCT	0Ω	94D46-55				Channel 5
E	Ant. Coil	0ΩCT	0Ω	94D46-56				Channel 6
F	Ant. Coil	0ΩCT	0Ω	94D46-57				Channel 7
G	Ant. Coil	0ΩCT	0Ω	94D46-58				Channel 8
H	Ant. Coil	0ΩCT	0Ω	94D46-59				Channel 9
I	Ant. Coil	0ΩCT	0Ω	94D46-60				Channel 10
J	Ant. Coil	0ΩCT	0Ω	94D46-61				Channel 11
K	Ant. Coil	0ΩCT	0Ω	94D46062				Channel 12
L	Ant. Coil	0ΩCT	0Ω	94D46-63				Channel 13
L2	Fil. Choke	0Ω		98AD5-13				
L3	Neut. Coil	0Ω		94C37-89				
L4A	RF, Mixer Grid, Osc. Coils	0Ω		94D46-72				Channel 2
B	RF, Mixer Grid, Osc. Coils	0Ω		94D46-73				Channel 3
C	RF, Mixer Grid, Osc. Coils	0Ω		94D46-74				Channel 4
D	RF, Mixer Grid, Osc. Coils	0Ω		94D46-75				Channel 5
E	RF, Mixer Grid, Osc. Coils	0Ω		94D46-76				Channel 6
F	RF, Mixer Grid, Osc. Coils	0Ω		94D46-77				Channel 7
G	RF, Mixer Grid, Osc. Coils	0Ω		94D46-78				Channel 8
H	RF, Mixer Grid, Osc. Coils	0Ω		94D46-79				Channel 9
I	RF, Mixer Grid , Osc. Coils	0Ω		94D46-80				Channel 10
J	RF, Mixer Grid, Osc. Coils	0Ω		94D46-81				Channel 11
K	RF, Mixer Grid, Osc. Coils	0Ω		94D46-82				Channel 12
L	RF, Mixer Grid, Osc. Coils	0Ω		94D46-83				Channel 13
L5	Fil. Choke	0Ω		98A45-14				
L6	RF Choke	0Ω		94D46-86				
L7	1st Video IF	.8Ω		94D46-85				
L8	Fil. Choke	0Ω		73A2-5				
L9	27.25MC Trap	.1Ω		72C96-23	19-3001	TV-189	4604	6 Microhenry
L10	2nd Video IF	.6Ω	.6Ω	72DU1-3	20-1006		6171A •	
L11	3rd Video IF	.6Ω	.6Ω	72C96-22	17-1063	TV-116	6350	
L12	4th Video IF	.6Ω	.6Ω	72B107-1				
L13	Series Peaking Coil	8Ω		73A5-15	19-3180 ■	TV-184 ■	6180 ■	190 Microhenries; wound on 4. 7KΩ resistor
L14	Shunt Peaking Coil	18Ω		73A5-7	19-3500	TV-188	6174	500 Microhenries
L15	4.5MC Trap	4.8Ω		72B99-6	20-1004 ▲	TV-151	1470	
L16	Series Peaking Coil	6.7Ω		73A5-13	19-3300 ▪		4565 ▪	284 Microhenries; wound on 33KΩ resistor
L17	Shunt Peaking Coil	8Ω		73A5-9	19-1923 †		4648 †	370 Microhenries; wound on 10KΩ resistor
L18	Bound IF	4.8Ω		72B99-7	20-1005 ▲	TV-151	1470	
L19	Ratio Detector	3.6Ω	.2ΩCT	72B68-2	17-1033 •	TV-110 ††	1468 or 6205 ¶	Tertiary winding-. 9Ω
L20	Horiz. Osc.	62Ω		94B17	19-1578	TV-163	6210	

* Enlarge mounting holes.
■ Parallel with 4. 7KΩ resistor.
▲ Disconnect capacitor in parallel.
▪ Parallel with 33KΩ resistor.
† Parallel with 10KΩ resistor.
†† Disconnect capacitor.
• Disconnect 180MMF capacitor across secondary.
¶ Use adaptor plate and disconnect capacitor.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (@ CURRENT 1000 °C.)	REPLACEMENT DATA ADMIRAL PART No	Stancor PART No	Merit PART No	Triad PART No	Halldorson PART No	Thordarson PART No
L21	.230A	78Ω	1. 2HY	74B18-2	C-2327	C-2994	C-21X ①	C5040	28C41

① Drill one new mounting hole.

FUSES

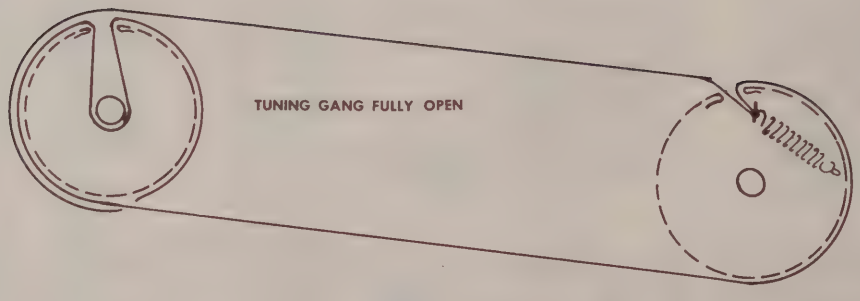
ITEM No.	TYPE	RATING	REPLACEMENT DATA ADMIRAL PART No. FUSE	ADMIRAL PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	8AG	3/8A 250V	84A4-3	84A8-1	362. 375 (3/8A-8AG)	387001	AGX 3/8	4520

ADMIRAL
CHASSIS 20A2, 20A2Z, 20D2

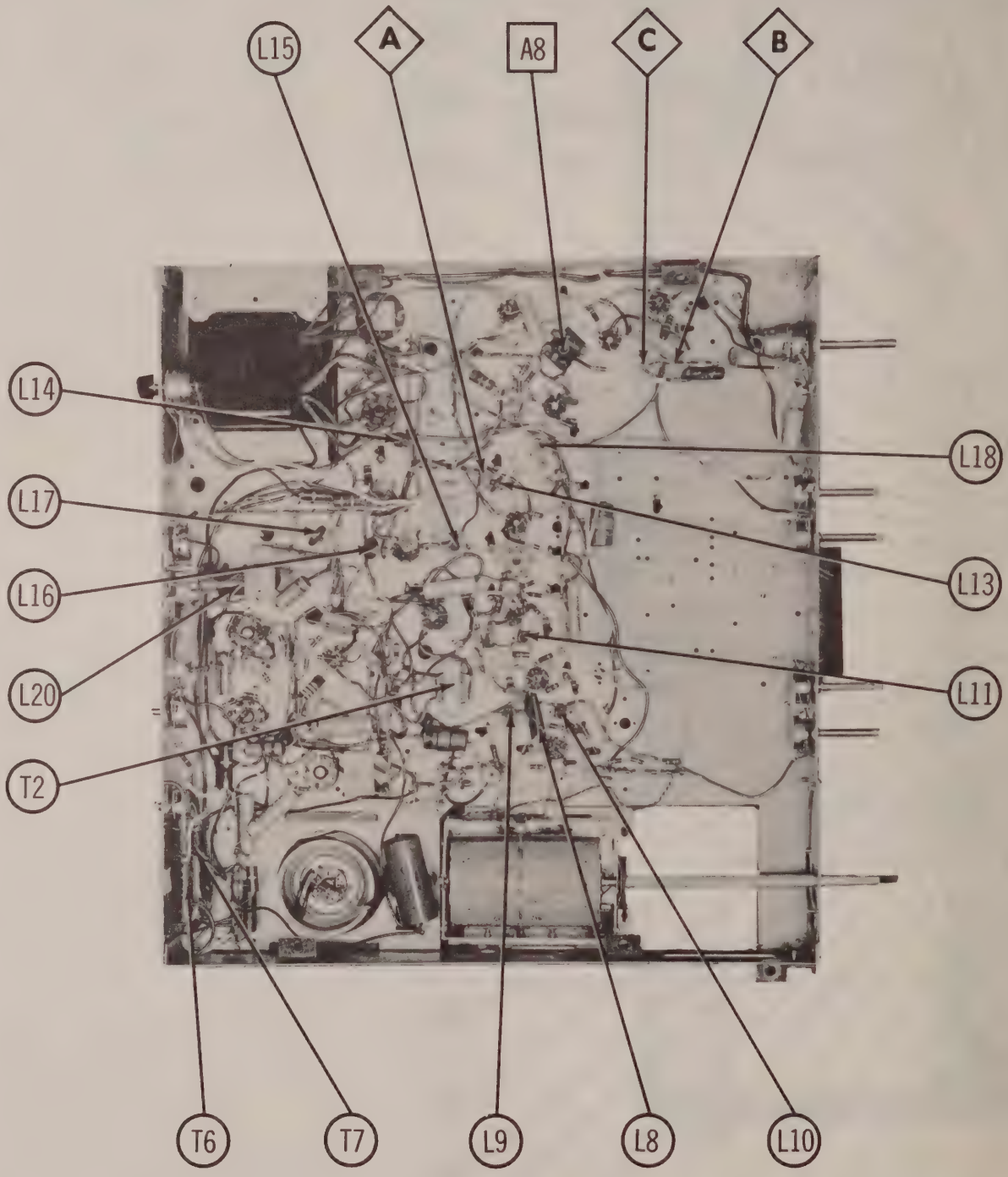
PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	ADMIRAL PART No.	NOTES
M2	Tuner	94D46-4	VHF
M3	Focus Magnet	94C53-1	Includes centering device
M4	Ion Trap	94A15-3	
	Cabinet	35E247-2	Mahogany - Model T2216A
	Cabinet	35E247-3	Blond - Model T2217A
	Cabinet	35E248-2	Mahogany - Model C2216AZ
	Cabinet	35E261-2	Mahogany - Model C2236A
	Cabinet	35E274-2	Mahogany - Model F2226
	Cabinet	35E253-2	Mahogany - Model F2216A
	Cabinet	35E253-3	Blond - Model K2217A
	Knob	33D107-3	On/off/volume - Models C2216AZ, C2236A, F2226, T2216A, T2217A
	Knob	33D107-4	On/off/volume - Models K2216A, K2217A
	Knob	33D107-13	Channel Selector - All Models
	Knob	33D107-14	Fine tuning - all models
	Knob	33D107-6	Contrast - Models T2216A, T2217A, C2216AZ, C2236A, F2226
	Knob	33A92-3	Vertical - Models K2216A, K2217A
	Safety Glass	21B71-5	All Models
	Mask	23E152-101	All Models
	Knob	33D107-7	Radio tuning - Ch. 20D2 only
	Knob	33B90-4	TV-Radio-Phono - Ch. 20D2 only



RADIO DIAL CORD STRINGING



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

TROUBLE SHOOTING AIDS (cont)

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DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V15, V16, V17 and V18. Check waveform W14. Check M1 fuse.

If Satisfactory	If Unsatisfactory
Check T3, T5A, T6, T7, C72, C70, C71, C69, R95, R94 and other associated components.	Check L20, C64, C65, C68, C66, R7, R90, R88 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V15, V16, V17, V18 and V19. Check T3, T5B, R95, R7 and other associated components.

BLOOMING

Check by substitution V16, V17, V18 and V19. Check R95, T3, T7 and C68. Check B+ filter and decoupling network.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6, V7 and V11. Check R60 and R61. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF Tuner Oscillator Circuit may be accomplished by removal of the Channel Selector and Fine Tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet to the right of the Channel Selector shaft.

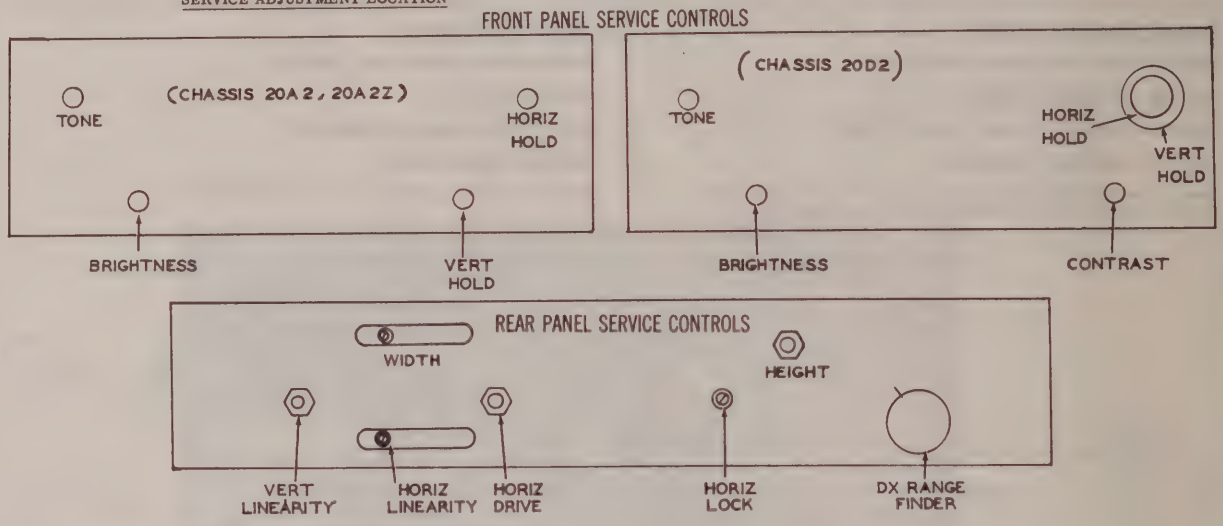
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 3 wood screws holding strip at top of safety glass. Remove strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

To remove picture tube remove safety glass and rear cover. Disconnect the tube socket, Ion trap and HV lead, remove 2 screws from front tube mounting bracket, remove picture tube.

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS-D X RANGE FINDER

Reception of weak signals can often be improved by advancing the DX range finder in a clockwise direction. However if the range finder control is turned too far in this direction the picture may disappear entirely on strong signals.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the Horiz. Oscillator Circuit can be made from the rear panel of the chassis. Set the Horiz. Hold Control at the Mid-position of its range and adjust the Horiz. Lock slug L20 until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF Detector Buzz, adjust the Ratio Detector Secondary L19 located on bottom of chassis. (See tube placement chart.)

FUSES

One fuse is used for Horiz. and Vert. Sweep protection. (For location see Tube placement chart.)

CENTERING

Centering is accomplished mechanically by means of a centering lever on the P. M. Focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

Remove 4 push-on type control knobs from front panel.

Remove 8 wood screws and 2 metal screws. Remove rear cover.

Disconnect speaker plug.

Remove 4 chassis bolts.

Remove chassis.

Remove 4 speaker nuts. Remove speaker.

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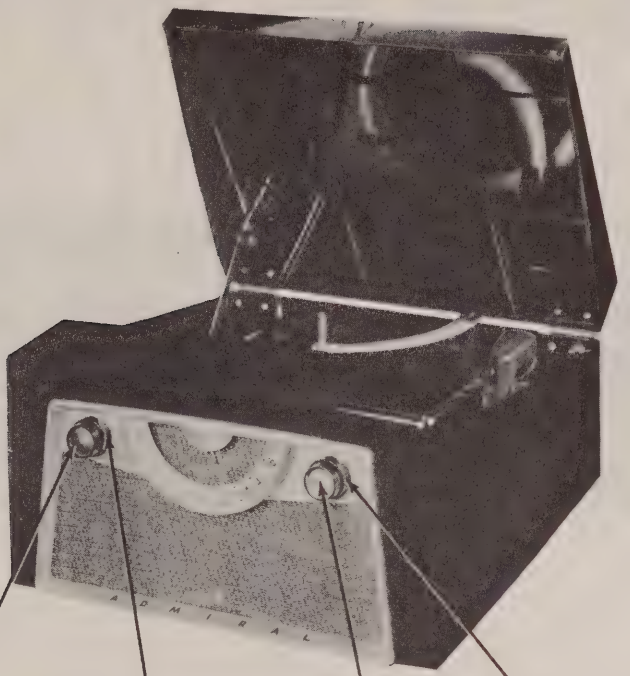

ADMIRAL
CHASSIS 5D3

TRADE NAME	Admiral Models 5D31, 5D32, 5D33 (Ch. 5D3)
MANUFACTURER	Admiral Corp., 3800 W. Cortland St., Chicago 47, Ill.
TYPE SET	AC Operated Radio-Phono Combination Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles — RATING .24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.001MFD	High side to antenna stator lug on tuning gang. Low side to B-.	455KC (400%Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	"	1620KC	"	"	A5	"
3.		Loop	1400KC	Tune to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FOR SERVICE INFORMATION ON ADMIRAL RECORD CHANGER UNIT MODEL RC600 - SEE PHOTOFACT SET #218-FOLDER #2 OR RECORD CHANGER MANUAL CM-5.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: ADMIRAL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	ADMIRAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	70	150	67B7-18	PRS150/80-40		BBRD8415		TCS505	TVA-2460	Red
B	70	150		PRS150/80		BR8015		TC26	RVA-1418	Yellow
C	20	25								Blue
C2	.1	200	64B1-30	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C3	47	500		1468-00005		5W5Q5		MCB225	Ms-45	Note 1
C4	10000		65C10-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C5	10000		65C10-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C6A	100		† 63A3-1	† PA-97-1	† PC-50	† 111TM1	† 1403-01	UC-531	† D-1	
B	100							UC-531		
C7	10000		65C10-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C8	100			S1100N750		TN22		NT-531	5TCU-T1	Note 2
C9	10000		65C10-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C10	.002	600	64B1-14	P688-002	D6-202	CUB6D2	GP2L-202	PT622	6TM-D2	
C11A	10000									
B	250		♦ 63A5-6	♦ PA-112-4	♦ PC-81	♦ 113TM2	♦ 1404-02		♦ T-2	
C										
C12	10000		65C10-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C13	.047	400	65A13-5	489ZX-047	DF-503	PJ4S47		PT4147	4TM-S47	
C14	.1	200	64B1-30	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C15	.1	200	64B1-30	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C16	10000			BPD01	DD-103	K082	811-01	DC-511	5HK-S1	

Note 1. Some models may use a 50MMF @ 500V in this application.
Note 2. Some models may use a 500MMF @ 500V in this application.
† Items C6A, C6B and R4 are combined in one unit.
♦ Items C11A, C11B, C11C, R8A and R8B are combined in one unit. When replacing items individually item C11B and C11C should total 250MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ADMIRAL PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2 Meg	½	75B11-23	* QJ-556R				Tone-Panel -Note
B	1 Meg	½						Volume & switch tapped @ 500K - Rear

Note. Some models may use an alternate control Part No. 75B11-8.
* CONCENTRIKIT EQUIVALENT KIT K-2; BASE ELEMENTS & SHAFTS B11-139 & P1-106 (Panel) B19-137X & R1-122 (Rear) & SWITCH 76-1.

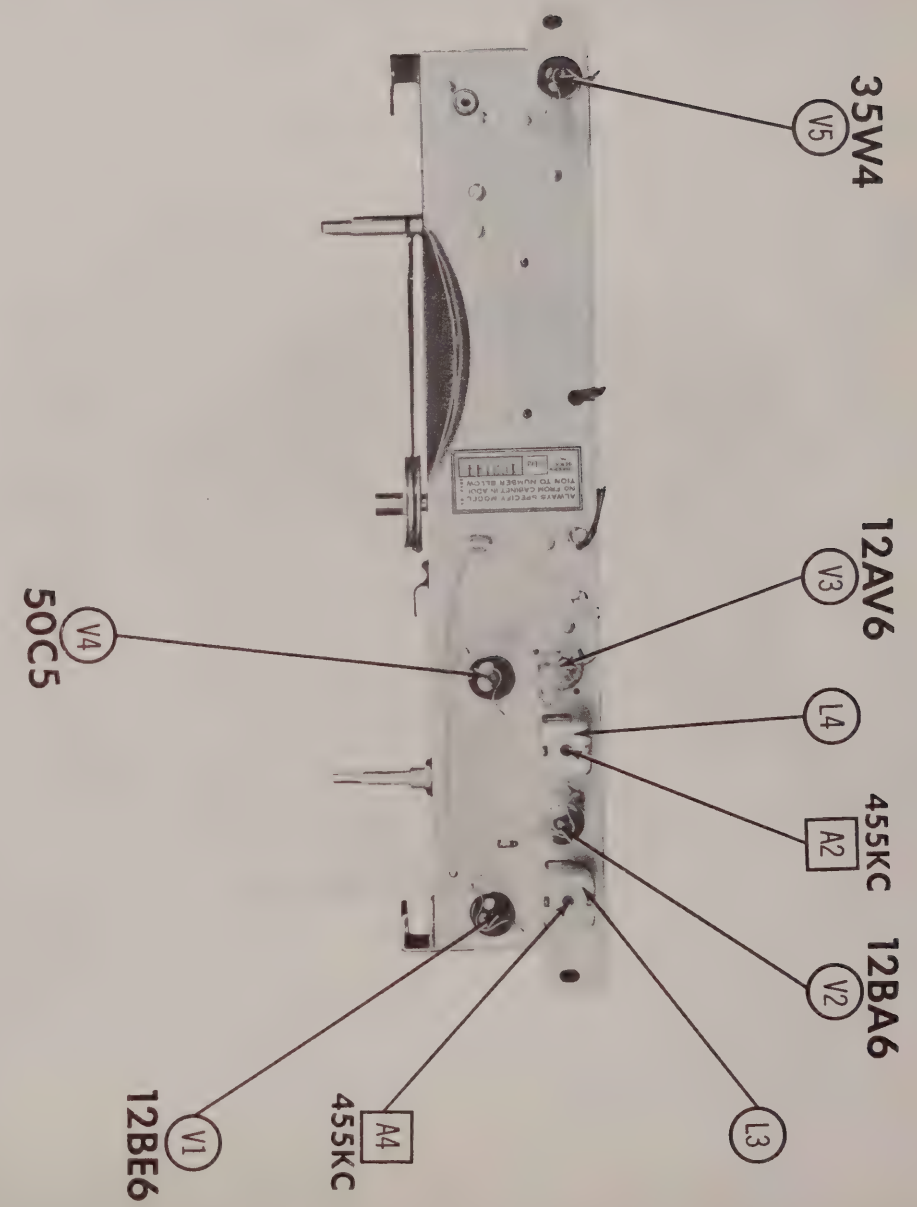
RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: ADMIRAL PART No.	IRC PART No.	NOTES
R2	22KΩ	½	60B8-223	BTS-22K	
R3	220Ω	½	60B8-221	BTS-220	
R4	1 Meg	½	60B8-105	BTS-1 Meg	
R5	47KΩ	½	† 63A3-1	BTS-47K	
R6	27KΩ	½	60B8-273	BTS-27K	
R7	4.7Meg	½	60B8-475	BTS-3.7Meg	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: ADMIRAL PART No.	IRC PART No.	NOTES
R8A	250KΩ	½	♦ 63A5-6		
B	500KΩ	½			
R9	220Ω	½	60B8-221	BTS-220	
R10	1000Ω	1	60B28-2	BTA-1000	
R11	33Ω	1	60B28-3		
R12	150Ω	½	60B-8-151	BTS-150	

† Items R4, C6A, C6B are combined in one unit.
♦ Items R8A, R8B, C11A, C11B, C11C are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: ADMIRAL PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	2.4KΩ	3.2Ω	79C46-1		A-3031 ①				① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: ADMIRAL PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	6"	PM	3.2Ω	78B81-1	ST-108 Mod. P8-X	6A1	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: ADMIRAL PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coil	.5Ω		69B164				
L2	Osc. Coil	6.5Ω		69A52-6		BC-381	70-Osc.	Tapped ⓐ .7Ω
L3	Input IF	17Ω	17Ω	72C28-7 #	16-6758	BC-352	12-C1	
L4	Output IF	17Ω	17Ω	72C28-7 #	16-6758	BC-353	12-C2	

* Alternate Part No. 72C128-7.

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: ADMIRAL PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	SHURE PART No. CARTRIDGE	SHURE PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	REMARKS
M1		AC-C-2M	A2			43	O-2 or S-2	

ASTATIC AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA: ADMIRAL PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M2		* JP-322 or † JPS-322	* B-416 or † B-419 or ♦ B-419D	* W-31AGA or † W-31AGS	* Metal † Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	ADMIRAL PART No.	NOTES
M3	Dial light	81A1-8	Bayonet # 47; not used in all models.
M4	Tuning cap.	68B55-1	32-345 20-120MMF
M5	Switch	76B28-1	Radio-Phono
M6	Motor	407C20	Phono-3 speed
A6	Trimmer cap	66A33	Ant. -3-30MMF
	Cabinet	34E63-3	Bottom-plastic-ebony
	Cabinet	34E63-5	Bottom-plastic-maroon
	Cabinet	34E63-8	Bottom-plastic-ivory
	Cabinet	34E63-4	Cover-plastic-ebony
	Cabinet	34E63-6	Cover-plastic-maroon
	Cabinet	34E63-9	Cover-plastic-ivory
	Knob	33C111-7	On-off, volume; ebony
	Knob	33C111-3	On-off, volume; maroon
	Knob	33C111-11	On-off, volume; ivory
	Knob	33C111-8	Radio-phono; ebony
	Knob	33C111-4	Radio-phono; maroon
	Knob	33C111-12	Radio-phono; ivory
	Knob	33C111-5	Tone-ebony
	Knob	33C111-1	Tone-maroon
	Knob	33C111-9	Tone-ivory
	Knob	33C111-6	Tuning - ebony
	Knob	33C111-2	Tuning - maroon
	Knob	33C111-10	Tuning - ivory
	Dial	A4103	Pointer

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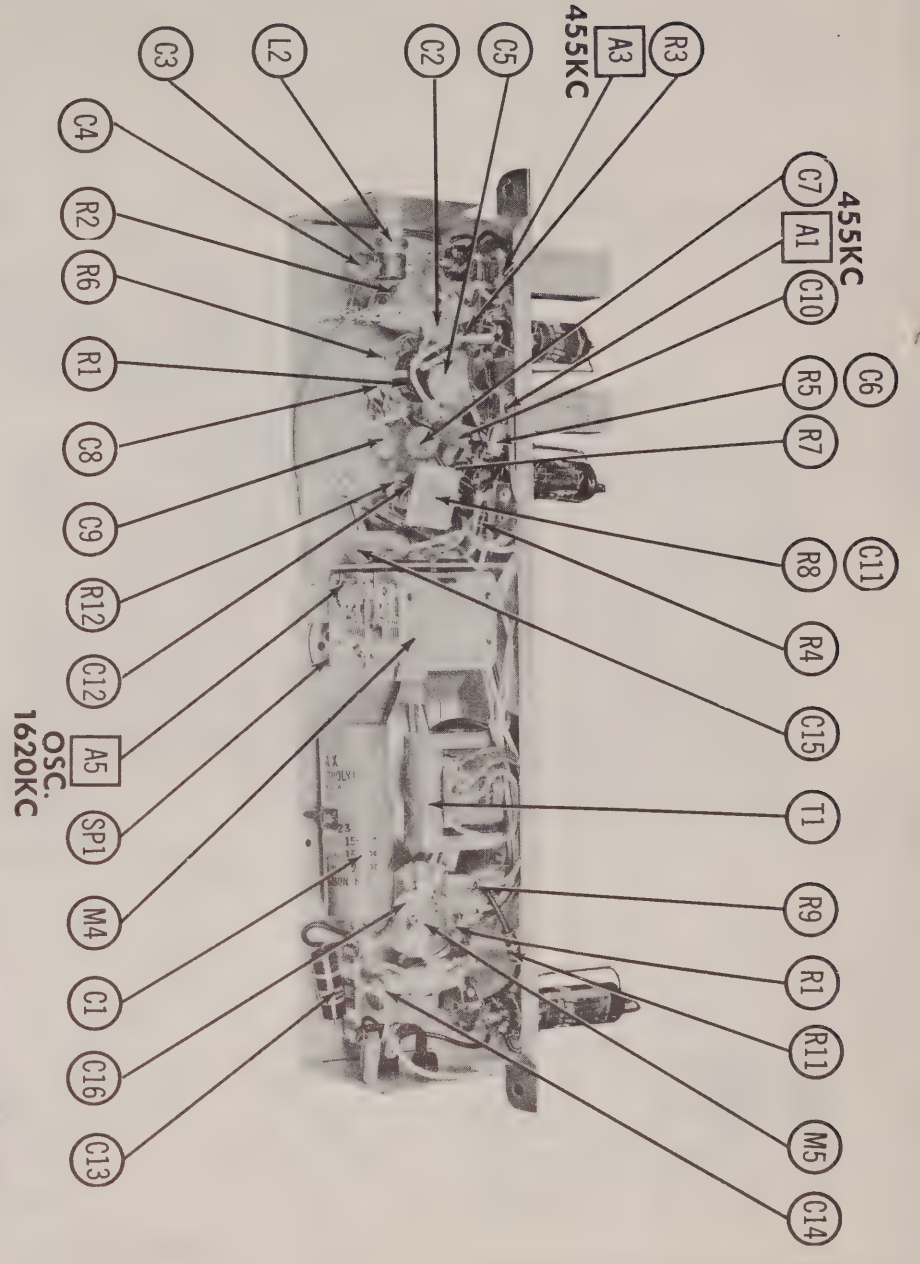
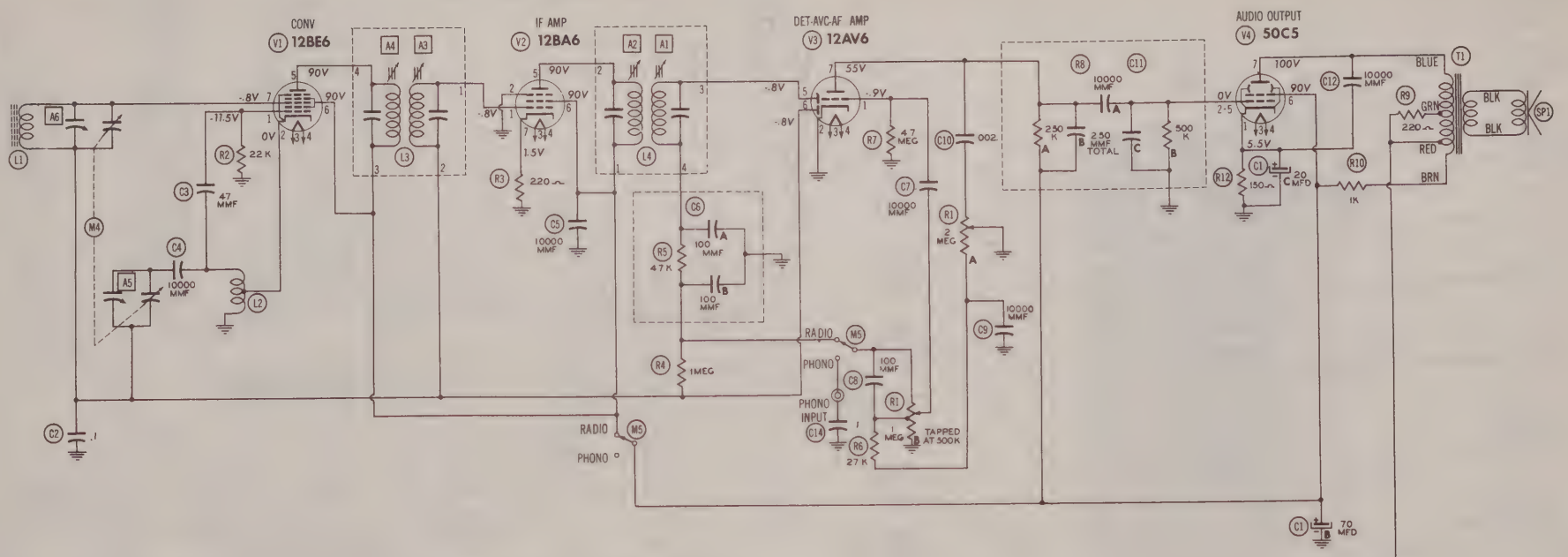
CHASSIS—BOTTOM VIEW





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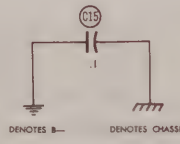
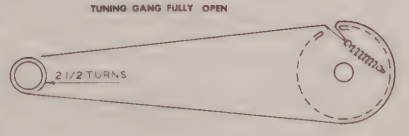


1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings
6. Volume control at maximum, no signal applied for voltage measurements

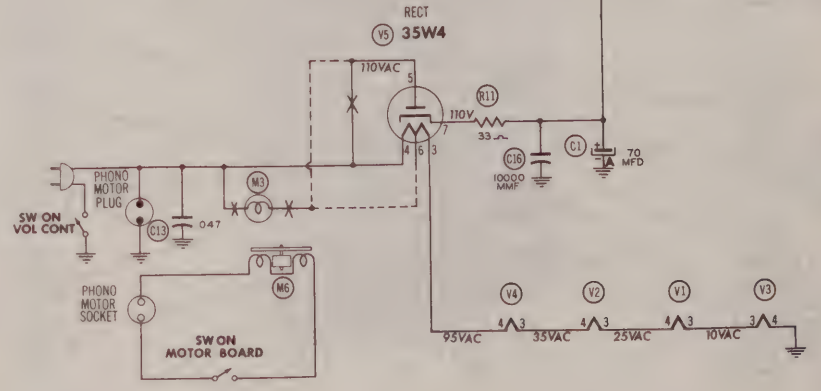
RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	. 7Ω	14Ω	36Ω	† 1KΩ	† 1KΩ	2 Meg
V 2	12BA6	2 Meg	0Ω	26Ω	39Ω	† 1KΩ	†1KΩ	220Ω
V 3	12AV6	4. 7Meg	0Ω	14Ω	0Ω	1. 05Meg	2 Meg	† 250KΩ
V 4	50C5	150Ω	500KΩ	39Ω	95Ω	500KΩ	† 1KΩ	† 225Ω
V 5	35W4	INF.	INF.	95Ω	130Ω	130Ω	120Ω	200KΩ

† MEASURED FROM PIN 7 OF V5.



DIAL CORD STRINGING



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AIRLINE MODELS 25GHM-2012A, 35GHM-2012A, 35GHM-2020A

AIRLINE MODELS 25GHM-2012A, 35GHM-2012A, 35GHM-2020A

TRADE NAME	Airline Models 25GHM-2012A, 35GHM-2012A, 35GHM-2020A
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Ill.
TYPE SET	AC Operated Radio-Phono Combination Superheterodyne Receiver With 3 Speed Automatic Record Changer
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det.-AVE-AF Amp., 50C5 Audio Output, 35W4 Rectifier

POWER SUPPLY 110-120 Volts AC-60 Cycles RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST 540-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer parallel with base of dial.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to antenna stator lug on tuning gang. Low side to B-	455KC (400Ω Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1620KC	"	"	A5	"
3.		Loop	1400KC	Tune gang to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT-SEE V-M MODEL 950-PHOTOFACT SET # 216-FOLDER # 11 OR RECORD CHANGER MANUAL CM-5.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

AIRLINE MODEL 25GHM-2012A

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: AIRLINE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AT6	12AT6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	▬ 40	150	33X106	AFH4-01		D001		FP410	TVL-4425	
B	■ 50	150								
C	▲ 50	150								
D	25	25								Note 1
C2	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C3	47		38X129	BPD-00047	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C4A	100		♦ 38X128	♦ PA-97-1	♦ PC-50	♦ 111TM1	♦ 1403-01	UC-531	♦ D-1	
B	100							UC-531		
C5	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C6	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C7	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C8A	5000									
B	250		* 38X115	* PA-112-1	* PC-70	* 112TM1	* 1406-01		* T-3	
C										
C9	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C10	.05	600		689ZX-05	DF-503	PJ6S5		PT615	6TM-S5	
C11	.22	400		P488-22		CUB4P22		PT4022	4TM-P22	

Note 2. Some models may use a 20MFD @ 25V in this application.
♦ Items C4A, C4B and R5 are combined in one unit.
* Items C8A, C8B, C8C, R9A and R9B are combined; when replacing items individually items C8B and C8C total 250MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRLINE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1 Meg	½	18X118		A47F1-1Meg	ABT-72	UT440	Volume tapped @ 170KΩ
B	Shaft		Not Req.		KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.		SWE12	KB-1	US-26	Attach to R1A
R2	1 Meg	½	W-3751					Tone & Switch

Note- Some models may use an alternate control Part No. 18X119.

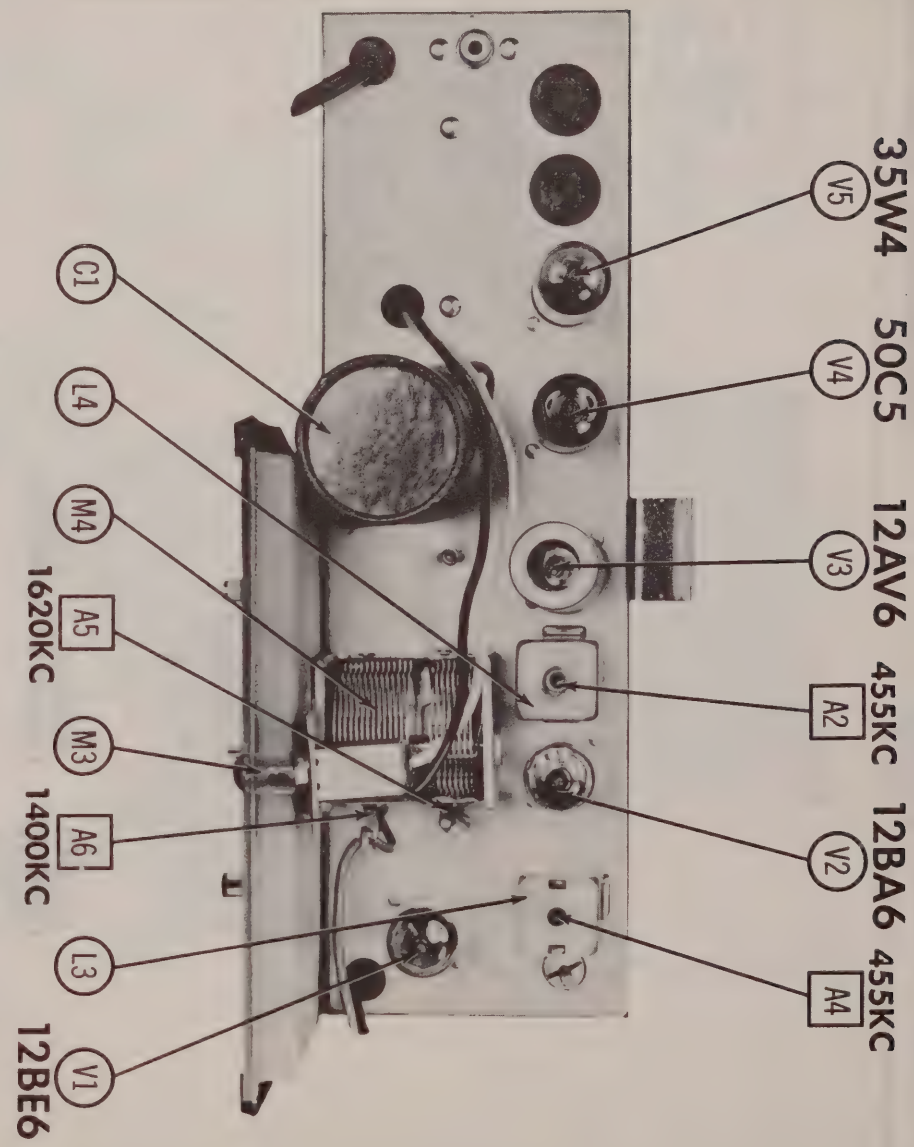
RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AIRLINE PART No.	IRC PART No.	NOTES
R3	100KΩ	½		BTS-100K	
R4	68Ω	½		BTS-68	
R5	47KΩ	½	♦	BTS-47K	
R6	2.2Meg	½		BTS-2.2Meg	
R7	33KΩ	½		BTS-33K	
R8	6.8Meg	½		BTS-6.8Meg	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AIRLINE PART No.	IRC PART No.	NOTES
R9A	250KΩ	½	*	BTS-220K	
B	500KΩ	½		BTS-470K	
R10	150Ω	½		BTS-150	
R11	180Ω	1		BTA-180	
R12	1000Ω	1		BTS-1000	
R13	220K	½		BTS-220K	

♦ Items R5, C4A, C4B are combined in one unit.
* Items R9A, R9B, C8A, C8B, C8C are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AIRLINE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	2.4KΩ	3.5Ω	31X100	A-3332	A-3025	S-12X	Z1101	24S50 ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	AIRLINE PART No.	VIKING PART No.	QUAM PART No.	
SP1	4" X 6"	PM	3.5Ω	12X107	46J6	46A1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	1.6Ω		9X122				
L2	Osc. Coil	2Ω	5.5Ω	9X102	14-1060 †	BC-381 †	71-Osc. †	
L3	Input IF	15Ω	15Ω	9X105	16-6758	BC-352	12-C1	
L4	Output IF	12Ω	12Ω	9X105	16-6758	BC-353	12-C2	

† Drill new mounting hole.

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA							REMARKS
	AIRLINE PART No.	ASTATIC PART No.		SHURE PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1	60H24	ACD-J	A-1 A-3	W22AB	A65MG A62A	46T	O-1 or S-1 and O-3	

ASTATIC, SHURE AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

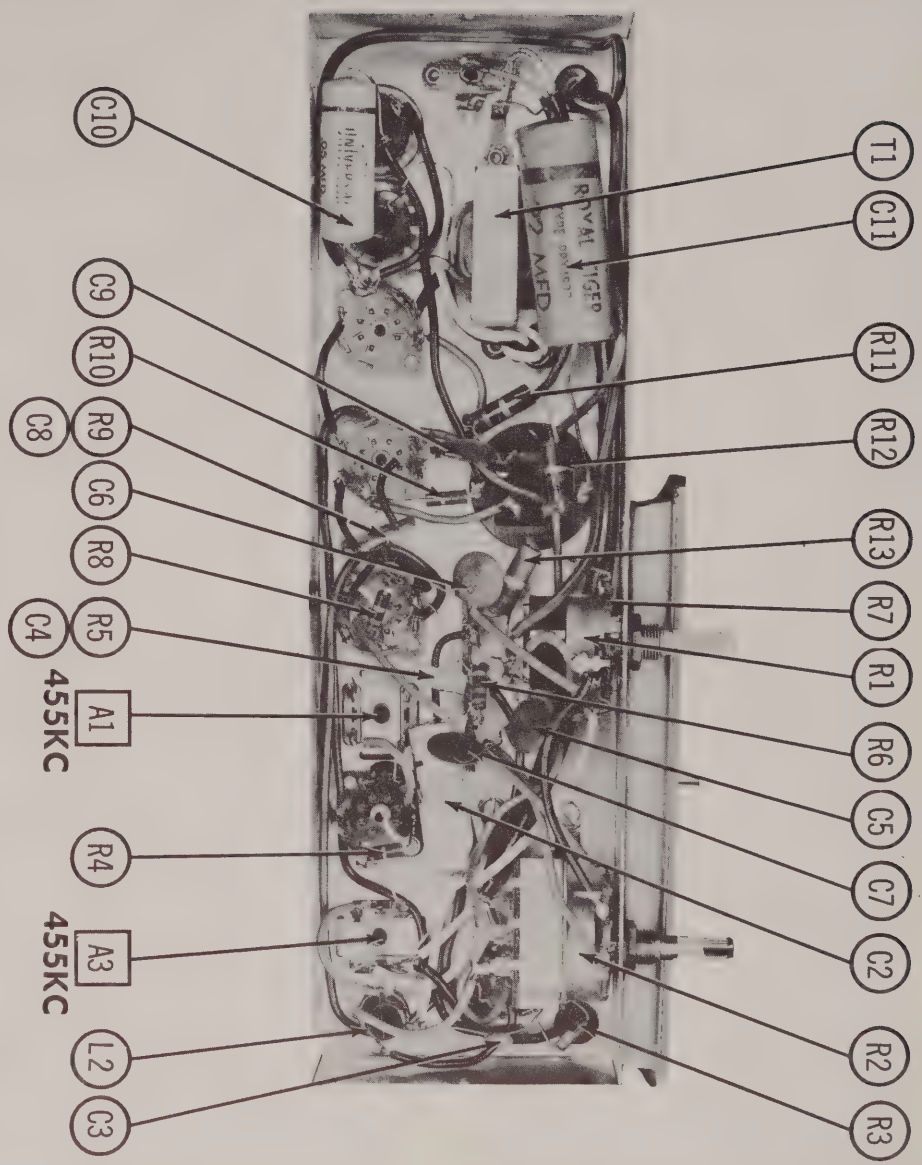
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	AIRLINE PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M2	61H29 78 Needle	* J-30 or † JPS-30	* C-320 or † C-318 or ♦ C-318D	* W-30A or † W-30S	* Metal † Jewel ♦ Diamond
	61H30 33-45 Needle	† JPS-30LP or * JP-30LP	* A-322 or † A-300 or ♦ A-300D	† W-30MGS or * W-30MGA	

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M3	Dial light		# 47 bayonet
M4	Tuning cap.	14X100	18-378MMF, 16-138MMF
	Knob	10X107	Tuning
	Knob	10X106	Tone & volume
	Dial pointer	25X100	
	Dial background	22X100	
	Plastic dial	20X103	

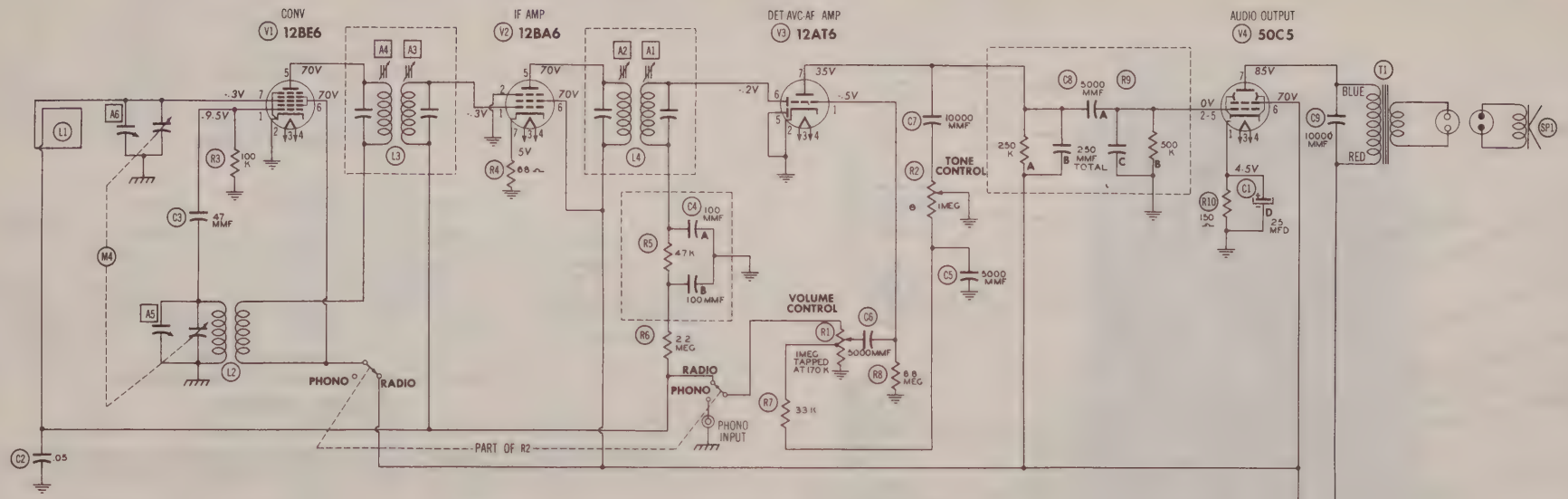
CHASSIS—BOTTOM VIEW



SET 256 FOLDER 4

AIRLINE MODEL 25GHM-2012A

AIRLINE MODEL 25GHM-2012A



IF = 455KC

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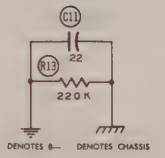

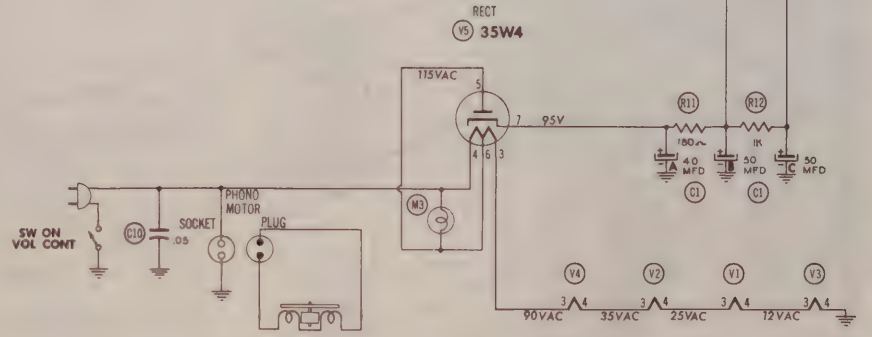

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	100KΩ	0Ω	24Ω	12Ω	† 1.1KΩ	† 1.1KΩ	3.2Meg
V 2	12BA6	3.2Meg	0Ω	36Ω	24Ω	† 1.1KΩ	† 1.1KΩ	68Ω
V 3	12AT6	6.8Meg	0Ω	12Ω	0Ω	0Ω	1 Meg	† 251KΩ
V 4	50C5	150Ω	500KΩ	90Ω	36Ω	500KΩ	† 1.1KΩ	† 330Ω
V 5	35W4	INF.	INF.	90Ω	119Ω	115Ω	115Ω	110KΩ

† MEASURED FROM PIN 7 OF V5.

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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MODEL 45BR-3186A

AIRLINE
MODEL 45BR-3186A

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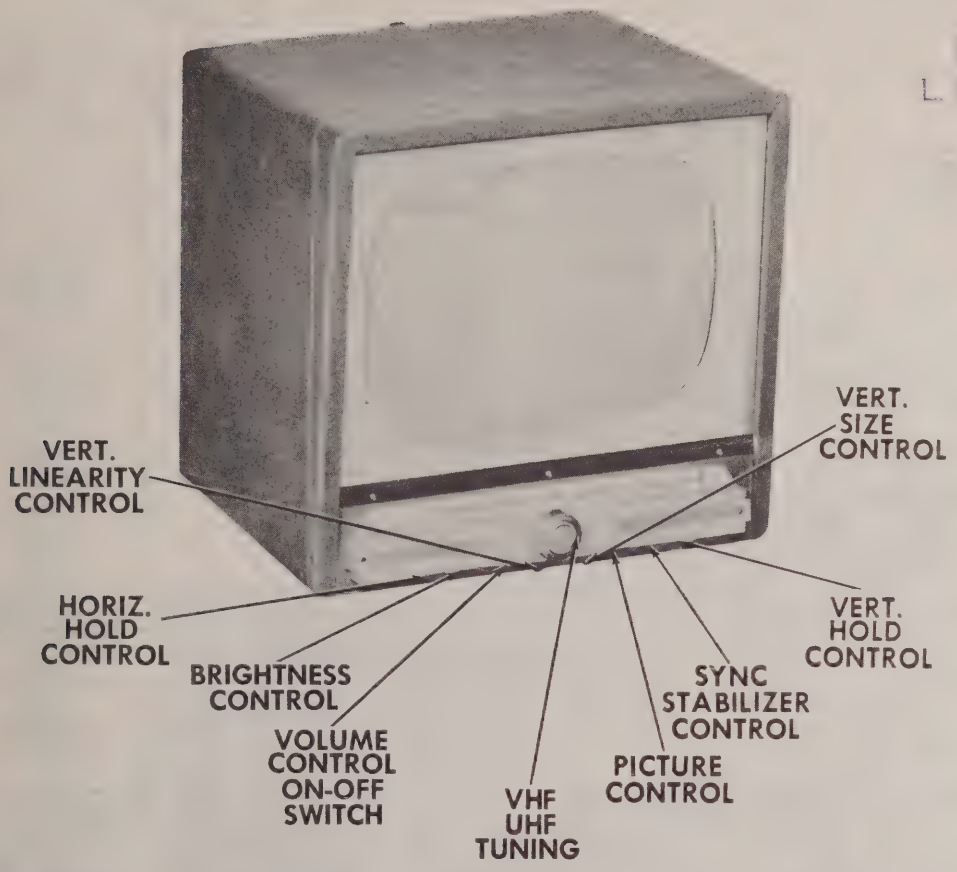

AIRLINE
MODEL 45BR-3186A

TRADE NAME	Airline Model 45BR-3186A
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Ill.
TYPE SET	Television Receiver
TUBES	Twenty-one
POWER SUPPLY	105-115 Volts AC-60 Cycle — RATING 1.6 Amp. @ 115 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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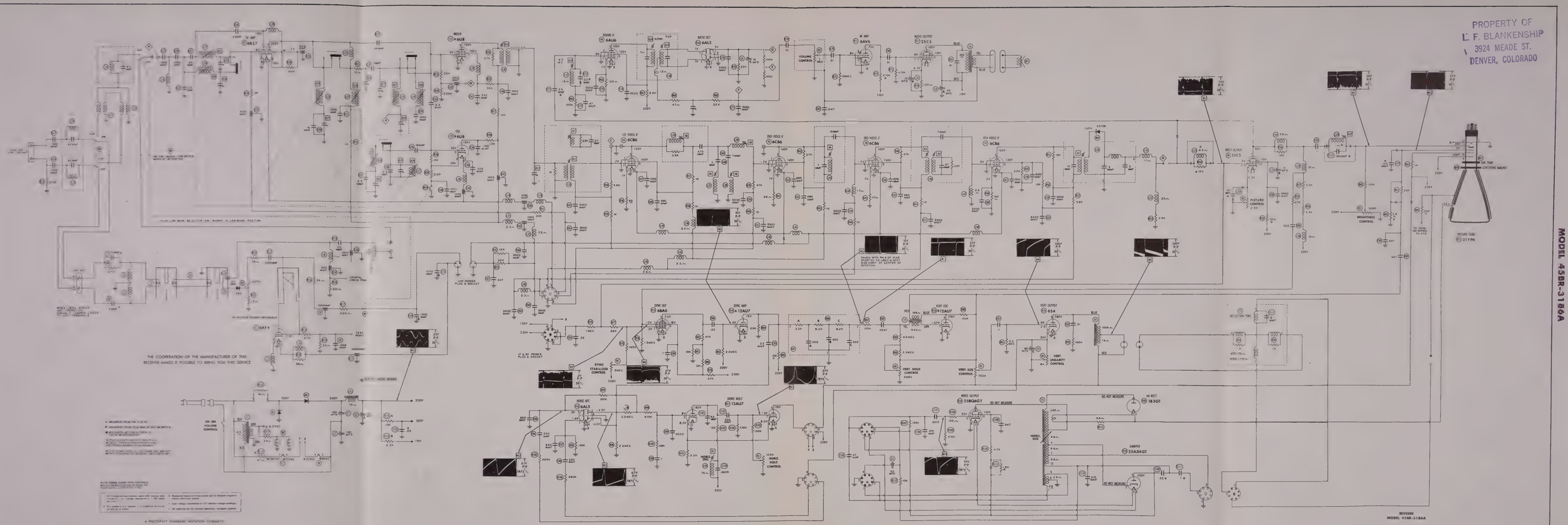
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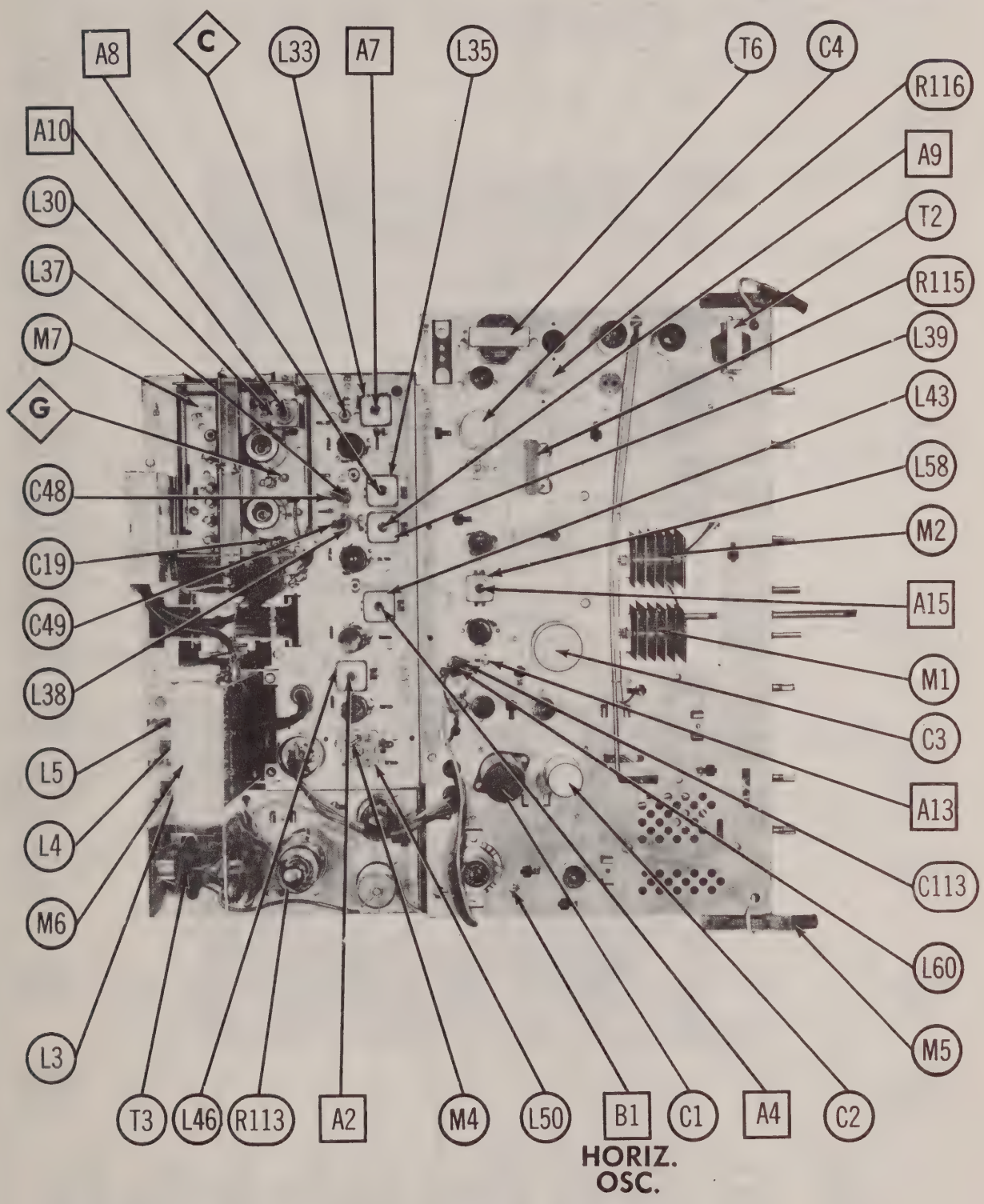
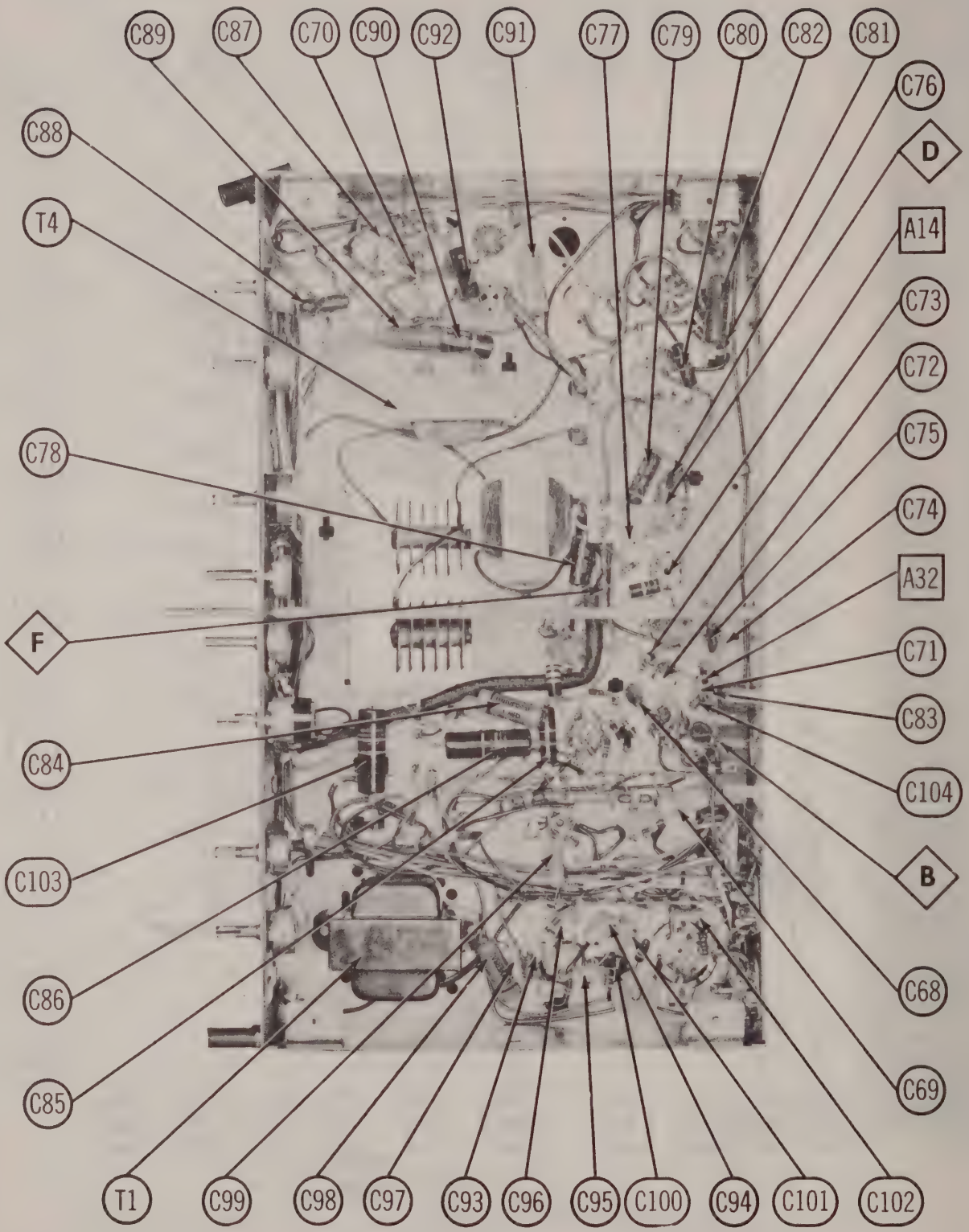


CHASSIS TOP VIEW

AIRLINE
MODEL 45BR-3186A



SWEEP CHASSIS-BOTTOM VIEW CAPACITOR AND ALIGNMENT IDENTIFICATION

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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal multivibrator tube (V17) to disable the high voltage.
Allow at least a 5 minute warm-up period for receiver and test equipment.
Use an isolation transformer to protect the test equipment.

VIDEO IF ALIGNMENT

Couple generator to alignment points (A) and (C) thru alignment plug (Fig. 1).
In adjusting A2, A3, A7 and A11, two peaks may be obtained. The correct peak occurs with the corefurtherest out of coil form.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to point (A). Low side to chassis.	Not used	43.7MC (Unmod)	7 (Approx.)	Use VTVM. DC probe thru 10KΩ to point (B). Common to chassis.	A1	Adjust for maximum deflection. Attenuate generator to maintain approximately 2 volts at VTVM.
2.	"	"	"	41.4MC	"	"	A2	Adjust for MINIMUM deflection.
3.	"	"	"	45.15MC	"	"	A3	Adjust for maximum deflection. Attenuate generator to maintain approximately 2 volts at VTVM.
4.	"	"	"	42.1MC	"	"	A4	"
5.	"	"	"	41.25MC	"	"	A5	Adjust for MINIMUM deflection.
6.	"	"	"	47.25MC	"	"	A6	"
7.	"	"	"	41.4MC	"	"	A7	"
8.	"	High side to point (C). Low side to chassis.	44MC (10MC Swp)	42.0MC 46.0MC	"	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A8, A9	Adjust for maximum amplitude and proper bandwidth similar to Fig. 2. Attenuate generator to maintain 2 volts peak to peak on scope.
9.	"	High side to point (A). Low side to chassis.	"	42.0MC 45.6MC	"	"	A10, A11, A12	Adjust for maximum amplitude and proper bandwidth similar to Fig. 3. Attenuate generator to maintain 2 volts peak to peak.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point (D) to chassis. The junction of these two resistors is alignment point (E) as shown on the schematic.
Short antenna terminals to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	.001MFD	High side to point (B). Low side to chassis.	4.5MC Unmod	Any non-interfering channel	DC probe to point (D). Common to chassis.	A13, A14	Adjust for maximum deflection.
11.	"	"	"	"	DC probe to point (F). Common to point (E).	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Short antenna terminals to chassis.
Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	.001MFD	High side to point (B). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point (D). Low side to chassis.	A13, A14	Disconnect stabilizing capacitor C4C. Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
11.	"	"	"	"	"	Vert. Amp. to point (F). Low side to chassis.	A15	Reconnect stabilizing capacitor C4C. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 5. SLIGHTLY retouch A14 for maximum amplitude and straightness of crossover lines.

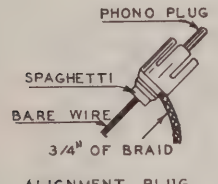

FIG. 1

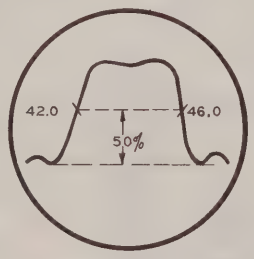

FIG. 2

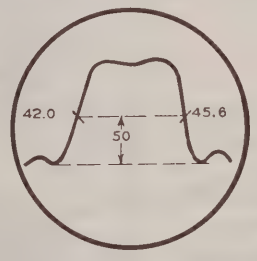

FIG. 3

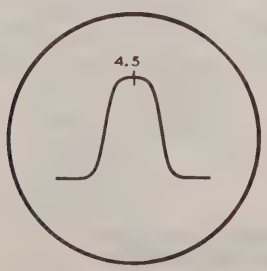

FIG. 4

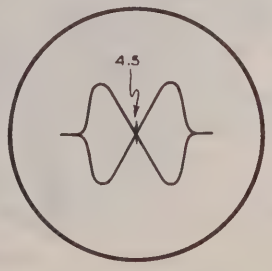

FIG. 5

AIRLINE MODEL 45BR-3186A

ALIGNMENT INSTRUCTIONS (cont)

TUNER ALIGNMENT

Preset the trimmer screws (A16 thru A23 as in Fig. 5. Set the tuner treadle bar to the top of its stroke in low band position (cores furtherest out of coil form . Adjust A26 thru A31 so that cores are 1½" from end of coil form.
Adjust A24 and A25 so that the cores are 15/8" from end of coil form.

LOW BAND RF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	85MC (15MC Swp)	83.25MC 87.75MC	6	Vert. Amp. to point (G). Low side to chassis.	A16, A17, A18	Adjust for maximum gain and response similar to Fig. 7. Adjust A18 for maximum gain between markers.
13.	"	"	85MC (10MC Swp)	83.25MC	6 (See Remarks)	Vert. Amp. to point (B). Low side to chassis.	A19	Rotate tuning control until bottom of treadle bar is 1 3/4" from top of tuner chassis. Adjust to place video marker at 50% on response curve as in Fig. 8.
14.	"	"	85MC (15MC Swp)	83.25MC 87.75MC	"	Vert. Amp. to point (G). Low side to chassis.	A16, A17	Readjust for maximum gain and flat topped response similar to Fig. 7.
15.	"	"	57MC (10MC Swp)	55.25MC	2 (See Remarks)	Vert. Amp. to point (B). Low side to chassis.	A24	Rotate tuning control until bottom of treadle bar is 1 1/8" from top of tuner chassis. Adjust to place video marker at 50% on response curve as in Fig. 8. Repeat step 13.
16.	Direct	High side to point (H). Low side to tuner chassis.	43MC (10MC Swp)	42.0MC 45.5MC	(See Remarks)	"	A18	Rotate tuning control until bottom of treadle bar is 5/8" from top of tuner chassis. Check overall IF response curve similar to Fig. 9. If necessary, retouch A18 to obtain desired response.
17.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	79MC (10MC Swp)	77.25MC 81.75MC	5	"		Check each low band channel for response similar to Fig. 10.
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

HIGH BAND RF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
18.	Two 120Ω carbon resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (15MC Swp)	211.25MC 215.75MC	13	Vert. amp. to point (G). Low side to chassis.	A20, A22, A23	Adjust for maximum gain and flat topped response curve similar to Fig. 7. Adjust A23 for maximum gain between markers.
19.	"	"	213MC (10MC Swp)	211.25MC	" (See remarks)	Vert. amp. to point (B). Low side to chassis.	A21	Rotate tuning control until bottom of treadle bar is 1 3/4" from top of tuner chassis. Adjust to place video marker at 50% on response curve as in Fig. 8.
20.	"	"	213MC (15MC Swp)	211.25MC 215.75MC	13	Vert. amp. to point (G). Low side to chassis.	A20, A22	Readjust for maximum gain and flat topped response similar to Fig. 7.
21.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7 (See remarks)	Vert. amp. to point (B). Low side to chassis.	A25	Rotate tuning control until bottom of treadle bar is 7/8" from top of tuner chassis. Adjust to place video marker at 50% on response curve as in Fig. 8. Repeat step 19. Check each high band channel for response similar to Fig. 10.
22.	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"		Check each high band channel for response similar to Fig. 10.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			

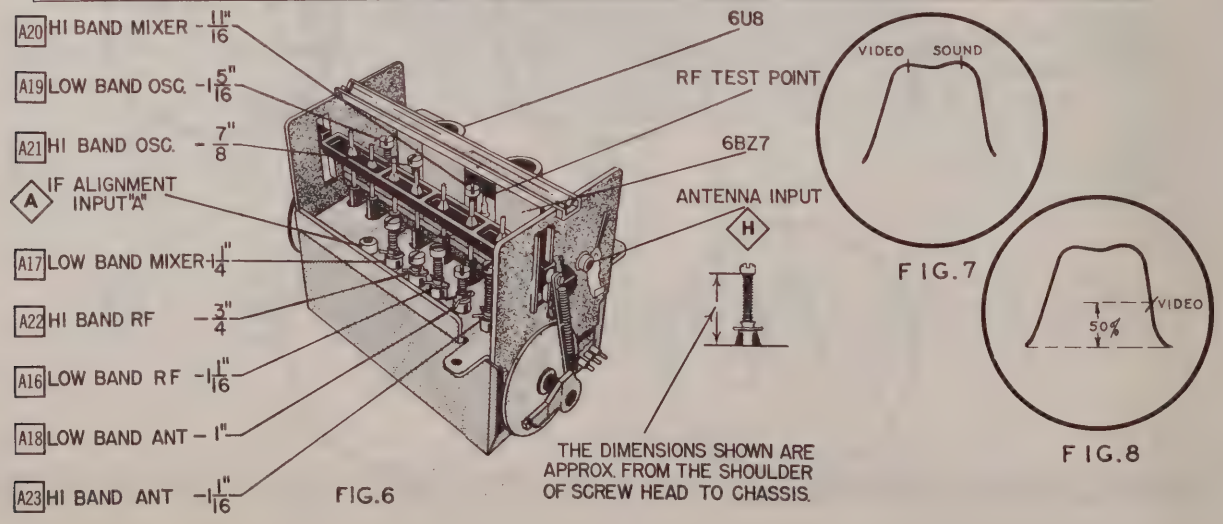
A20 HI BAND MIXER - 11/16"
A19 LOW BAND OSC. - 15/16"
A21 HI BAND OSC. - 7/8"
A IF ALIGNMENT INPUT "A"
A17 LOW BAND MIXER - 1/4"
A22 HI BAND RF - 3/4"
A16 LOW BAND RF - 1 1/16"
A18 LOW BAND ANT - 1"
A23 HI BAND ANT - 1 1/16"
6U8
RF TEST POINT
6BZ7
ANTENNA INPUT
H
THE DIMENSIONS SHOWN ARE APPROX. FROM THE SHOULDER OF SCREW HEAD TO CHASSIS.

FIG.6

FIG.7

FIG.8

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ALIGNMENT INSTRUCTIONS (cont)

4.5 MC TRAP ALIGNMENT

Tune in a TV station and adjust the tuning control until sound bars just appear in the picture.
Starting with A32 all the way out adjust clockwise for minimum sound bars in picture.

UHF TUNER ALIGNMENT

Do not remove UHF tuner from chassis. Check to see that 6AF4 (V1) is firmly seated in its socket and shield clip is seated in the tube shield notch.
Check oscillator grid current by connecting a multimeter across R14 (22Ω). A reading of 10 to 30 microamperes should be obtained if oscillator is functioning normally.
Both the oscillator and crystal detector may be checked by placing the multimeter across R10 (22Ω). A reading of 5 to 40 microamperes indicated oscillator and crystal are functioning normally.

MECHANICAL ALIGNMENT OF RF AND MIXER RIBBONS

1. Remove spring and connecting bar on UHF tuner coupling arm.
2. Rotate UHF tuner coupling arm to its counter clockwise stop.
3. The RF and mixer ribbons should be 4 7/8 " as indicated in Fig. 11.
4. If the ribbons are not 4 7/8" as indicated, loosen pulley positioning screw slightly and reposition by turning drive pulleys.
5. Replace spring and connecting bar on UHF tuner coupling arm.

UHF ALIGNMENT

Connect the negative lead of a 6 volt battery to Pin 8 of the RF power socket. Connect positive lead to chassis.
Adjustment of tracking screws must be made from crystal side of tuner and in sequence from 1 through 10.
To perform step 33 it may be necessary to remove the spring and connecting bar on the UHF tuner coupling arm and turn the UHF tuner coupling arm clockwise.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
23.	Two 120Ω Carbon Resistors	Across UHF antenna terminals with 120Ω in each lead.	890MC (10MC Swp)	895MC	(See Remarks)	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.		Loosely couple marker generator to sweep generator leads. Loosen the two oscillator cavity screws and rotate oscillator adjustment (See Fig. 11) to obtain response curve similar to Fig. 12 with 895MC marker falling at 50%. Set RF and mixer ribbons to 4 3/4" as indicated in Fig. 11.
24.	"	"	865MC (10MC Swp)	870.5MC	"	"	Tracking screws (Pair #1)	Set ribbons to 4 5/8" as indicated in Fig. 11. Adjust for response similar to Fig. 12.
25.	"	"	775MC (10MC Swp)	780.5MC	"	"	Tracking screws (Pair #2)	Set ribbons to 4 3/16". Adjust for response similar to Fig. 12.
26.	"	"	726MC (10MC Swp)	731MC	"	"	Tracking screws (Pair#3)	Set ribbons to 3 7/8". Adjust for response similar to Fig. 12.
27.	"	"	671MC (10MC Swp)	676MC	"	"	Tracking screws (Pair #4)	Set ribbons to 3 7/16". Adjust for response similar to Fig. 12.
28.	"	"	624MC (10MC Swp)	629.5MC	"	"	Tracking screws (Pair #5)	Set ribbons to 3 1/8". Adjust for response similar to Fig. 12.
29.	"	"	585MC (10MC Swp)	590MC	"	"	Tracking screws (Pair #6)	Set ribbons to 2 3/4". Adjust for response similar to Fig. 12.
30.	"	"	545MC (10MC Swp)	550MC	"	"	Tracking screws (Pair#7)	Set ribbons to 2 7/16". Adjust for response similar to Fig. 12.
31.	"	"	507MC (10MC Swp)	512MC	"	"	Tracking Screws (Pair#8)	Set ribbons to 2 1/16". Adjust for response similar to Fig. 12.
32	"	"	478MC (10MC Swp)	483.5MC	"	"	Tracking screws (Pair#9)	Set ribbons to 1 11/16". Adjust for response similar to Fig. 12.
33.	"	"	455MC (10MC Swp)	460MC	"	"	Tracking screws (Pair #10)	Set ribbons to 1 3/8". Adjust for response similar to Fig. 12.

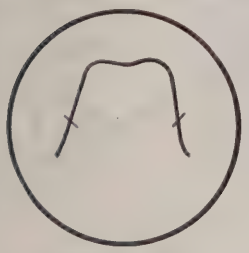


FIG.9

FIG.10

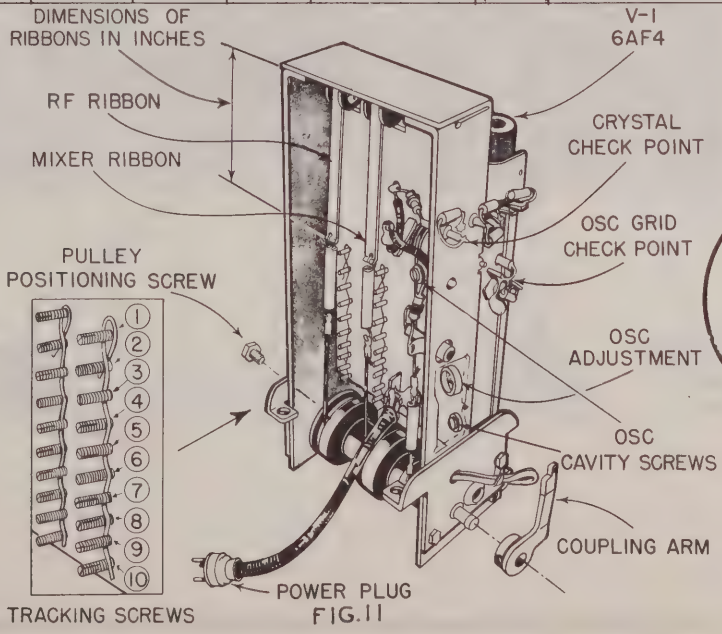


FIG.11

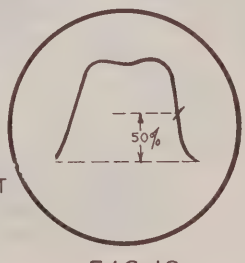
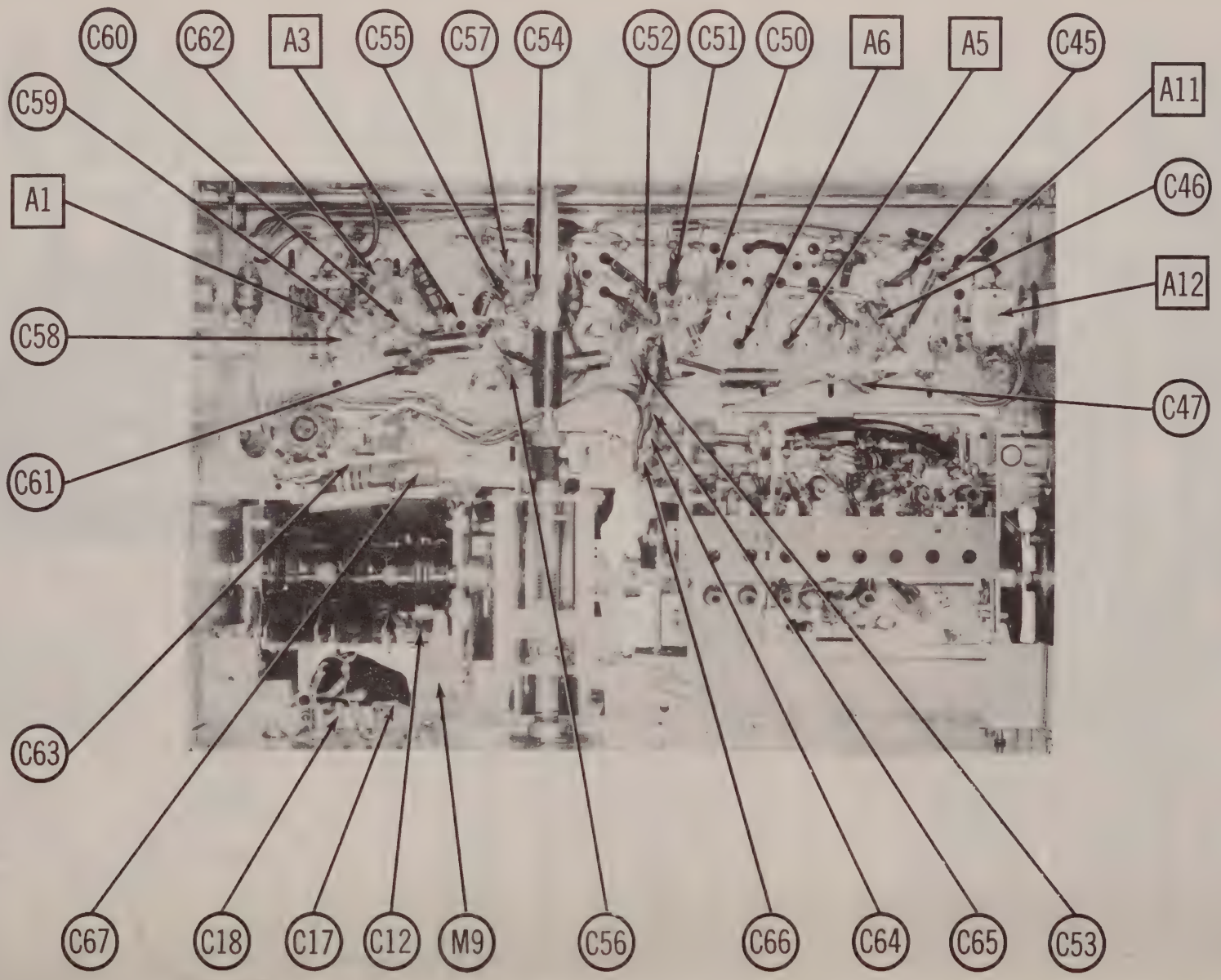
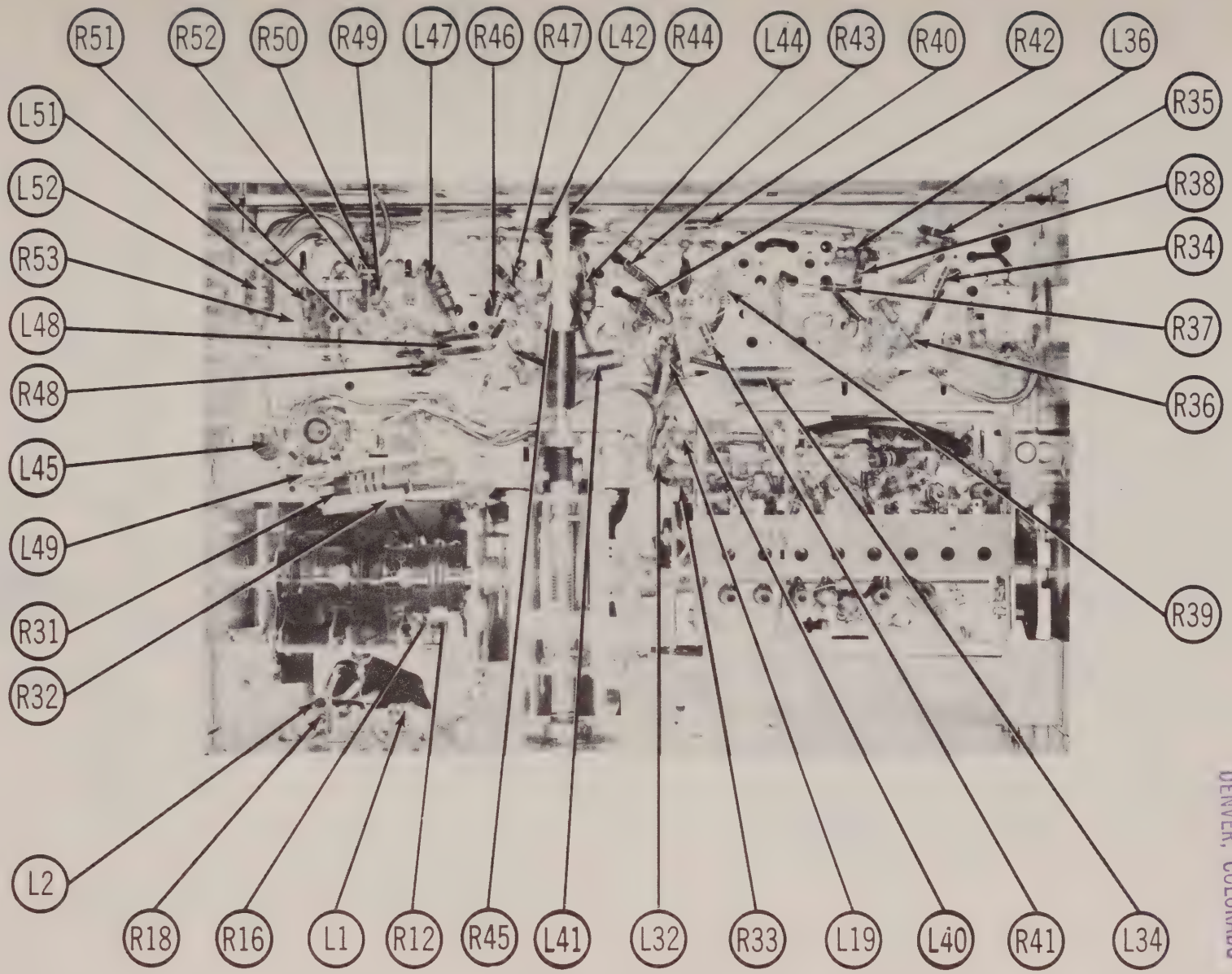


FIG.12

AIRLINE
MODEL 45BR-3186A



RF-IF CHASSIS- BOTTOM VIEW CAPACITOR AND ALIGNMENT IDENTIFICATION



RF-IF CHASSIS- BOTTOM VIEW RESISTOR AND INDUCTOR IDENTIFICATION

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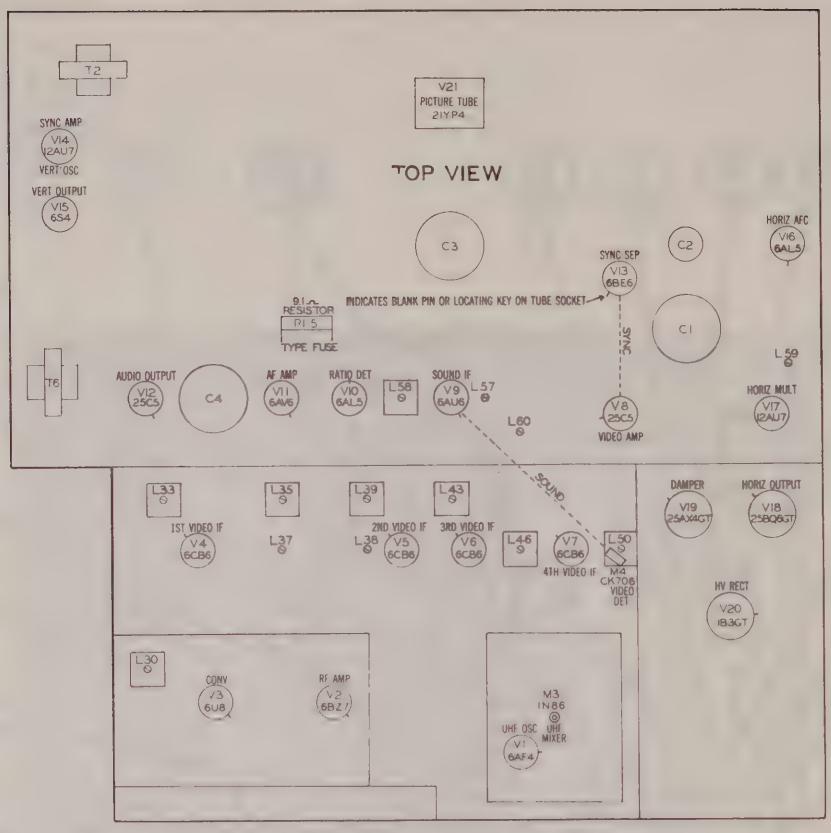
TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

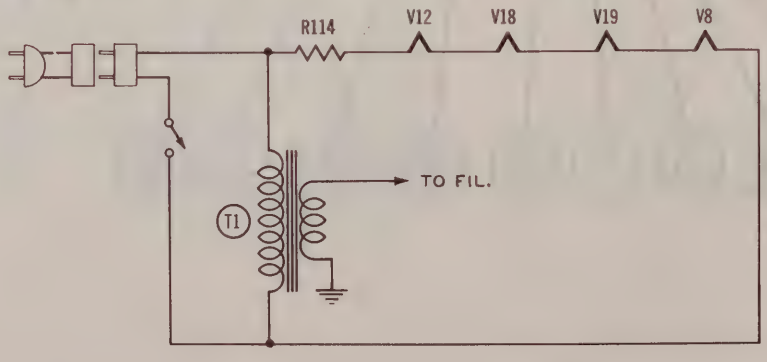
POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1, M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V3, V4, V5, V6, V7, V8,V12 (V1 UHF only)**
No pic, no sound, has snow - **V2, V3, V4**
No pic, has sound, has raster - **V8, V21**
Has pic, no sound - **V9, V10, V11, V12**

SYNC FAILURE
No vert. sync - **V14**
No horiz. sync - **V14, V16, V17**
No vert. or horiz. sync - **V13, V14**

SWEEP FAILURE
No raster, has sound - **V17, V18, V19, V20**
No vertical deflection - **V14, V15**
Poor vert. linearity or foldover - **V14, V15**
Poor horiz. linearity or foldover - **V17, V18, V19, V20, V21**
Narrow picture - **V17, V18, V19, V20, M1, M2**
Vert. off freq. - **V14**
Horiz. off freq. - **V14, V16, V17**

Since this receiver employs tubes used in series-parallel filament network , an open filament in any tube in series may cause the set to be inoperative. (See circuit below.)



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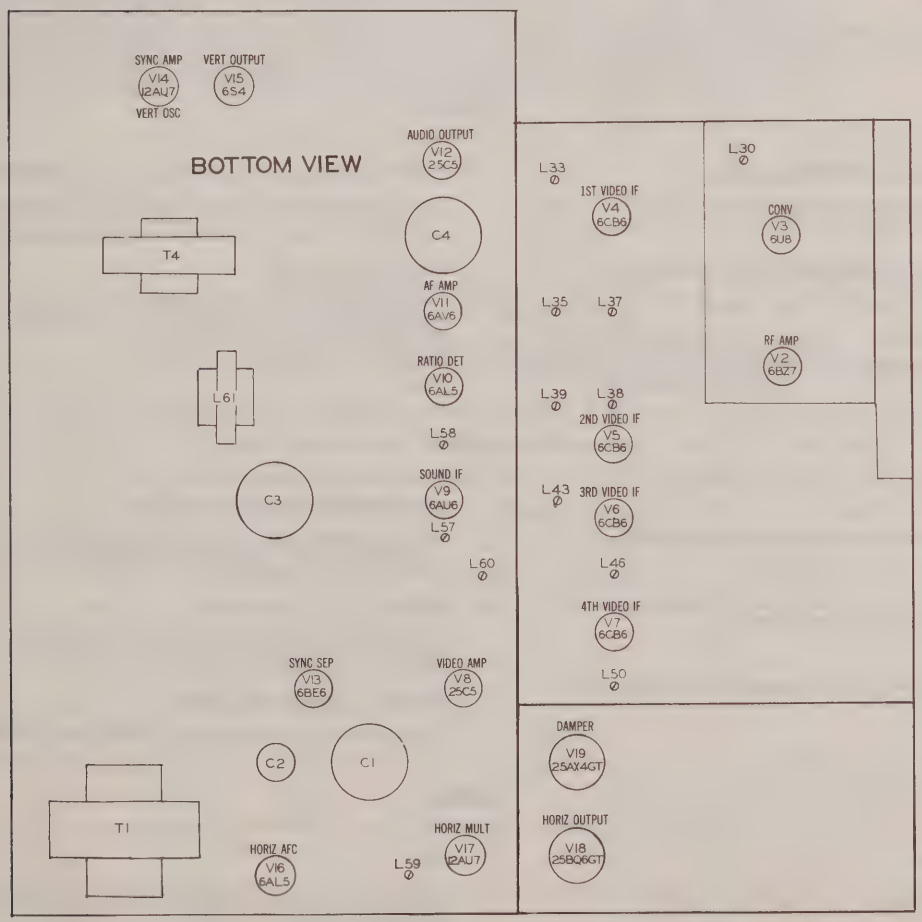
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	†■8KΩ	4.7KΩ	.1Ω	0Ω	0Ω	4.7KΩ	†■8KΩ		
V 2	6BZ7	INF	1Meg	0Ω	.1Ω	0Ω	†1.1KΩ	INF	INF	0Ω
V 3	6U8	†1.6KΩ	240KΩ	†43KΩ	.1Ω	0Ω	†10KΩ	0Ω	2.2KΩ	12KΩ
V 4	6CB6	1Meg	82Ω	0Ω	.1Ω	†3.6KΩ	†2.6KΩ	0Ω		
V 5	6CB6	1Meg	68Ω	0Ω	.1Ω	†2.6KΩ	†2.6KΩ	0Ω		
V 6	6CB6	1Meg	47Ω	0Ω	.1Ω	†2.6KΩ	†2.6KΩ	0Ω		
V 7	6CB6	2.2Ω	180Ω	.1Ω	0Ω	†5.7KΩ	†10KΩ	0Ω		
V 8	25L5	280Ω	3.9KΩ	♦0Ω	♦25Ω	3.9KΩ	†150KΩ	†7.3KΩ		
V 9	6AU6	100KΩ	0Ω	.1Ω	0Ω	†8.3KΩ	†8.3KΩ	120Ω		
V 10	6AL5	22KΩ	0Ω	.1Ω	0Ω	INF	0Ω	INF		
V 11	6AV6	10Meg	0Ω	0Ω	.1Ω	0Ω	0Ω	†470KΩ		
V 12	25C5	120Ω	470KΩ	♦75Ω	♦100Ω	470KΩ	†2.5KΩ	†2.3KΩ		
V 13	6BE6	70KΩ	0Ω	0Ω	.1Ω	†70KΩ	†47KΩ	1.5Meg		
V 14	12AU7	†55KΩ	†2.2Meg	0Ω	.1Ω	.1Ω	▲510KΩ	7.2Meg	0Ω	0Ω
V 15	6S4	INF	2.8KΩ	2.2Meg	0Ω	.1Ω	2.2Meg	INF	INF	▲11KΩ
V 16	6AL5	150KΩ	2.2Meg	0Ω	.1Ω	4.5Meg	0Ω	2.2Meg		
V 17	12AU7	†10.1KΩ	4.9Meg	2.2KΩ	0Ω	0Ω	†150KΩ	200KΩ	2.2KΩ	.1Ω
V 18	25BQ6G	INF	♦50Ω	2.5Ω	†4.8KΩ	470KΩ	470KΩ	♦75Ω	0Ω	TOP CAP ▲9.6Ω
V 19	25AX4GT	INF	INF	550KΩ	INF	†70Ω	INF	♦50Ω	♦25Ω	
V 20	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▲275Ω
V 21	21YP4	0Ω	27.5KΩ	PIN 6 †70Ω	PIN 10 ▲11KΩ	PIN 11 †130KΩ	PIN 12 .1Ω			

† MEASURED FROM OUTPUT OF M1
■ MEASURED IN UHF POSITION
♦ MEASURED FROM COLD SIDE OF OFF/ON SWITCH
▲ MEASURED FROM PIN 3 OF V19



TUBE PLACEMENT CHART
SET 256 FOLDER 5

AIRLINE
MODEL 45BR-3186A

TROUBLE SHOOTING AIDS

CAUTION

Use a line isolation transformer to remove shock hazzard and prevent damage to receiver and/or test equipment.

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check horizontal size adjustment. Check by substitution V18 and V19. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check R110, R111, C108, T3, T5A and other associated components.	Check R107, R109, C106, C107 and other associated components.

DRIVE LINES

Check horizontal size adjustment. Check by substitution V17, V18 and V19. Check R107, R109, R110, R111, C106, C107, C108, T3, T5A and other associated components. Check high voltage power plug for proper seating.

COMPRESSED AT LEFT SIDE

Check horizontal size adjustment. Check by substitution V18, V19 and V17. Check components associated with stages especially T3, and T5A.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V17, V18 and V19. Check C99 for open. Check T3, T5A and other associated components for high voltage ARC-over.

XMAS TREE EFFECT

Substitute V17. Check L59, C100, C101, C102 and other associated components for failure or change of value.

VERTICAL

LOSS OF SWEEP

Check by substitution V14 and V15. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R4 and other associated circuit components.	Check T2, C91, R5, R91 and other associated circuit components.

INSUFFICIENT SWEEP

Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Check by substitution V14 and V15. Check T4, T5B, C3C and other associated circuit components.

COMPRESSED AT TOP

Check by substitution V14 and V15. Check C91, R91 and other associated components.

FOLDS

Substitute V14 and V15. Check components associated with V14B and V15 for failure or change of value.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V13 and V14. Check adjustment of sync stabilizer control. Check components associated with V13 and V14A for failure or change of value.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Check by substitution V13 and V14. Check waveform W6.

If Satisfactory	If Unsatisfactory
Check components associated with V14B.	Check vertical integrator and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check adjustment of sync stability control. Check by substitution V16 and V17. Check C98, C99, C100, C93, C102, C94, C96, R105, R106, R101, R102, R103, R107, R84, R85, L59 and other associated components.

HORIZONTAL BENDING

Check adjustment of sync stability control. Check by substitution V13, V14, V16 and V17. Check R112, R107, R105, R106, C94, C96, C98, C99, C5 and other associated components.

VIDEO

LOSS OF VIDEO

Substitute V8. Check picture tube and other associated components.

SOUND BARS

Adjust tuner, tuning control for best picture and sound. Check V4, V5, V6, V7, V2, V3, V8, V14 and V15 for microphonoics.

POOR CONTRAST

Substitute V8. Check video detector assembly. Check picture tube and other associated components.

OVERLOADED OR NEGATIVE PICTURE

Check by substitution V4, V5, V6, V7, V8, video detector crystal and V2. Check associated circuit components including C45, C50, C65, C51, C54, C23, C83, R53, R75 and R6.

SMEAR

Check by substitution V8, V7, V6, V5 and V4. Check video detector crystal. Check R57, R58, R53, R6, C3B, C68, C69, L51, L52, L54, L55, L56, picture tube and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check V2, V4, V5, V6, V7 and V8 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10, V11 and V12. Check stages of V11 and V12 using audio signal generator. Apply audio signal across R71.

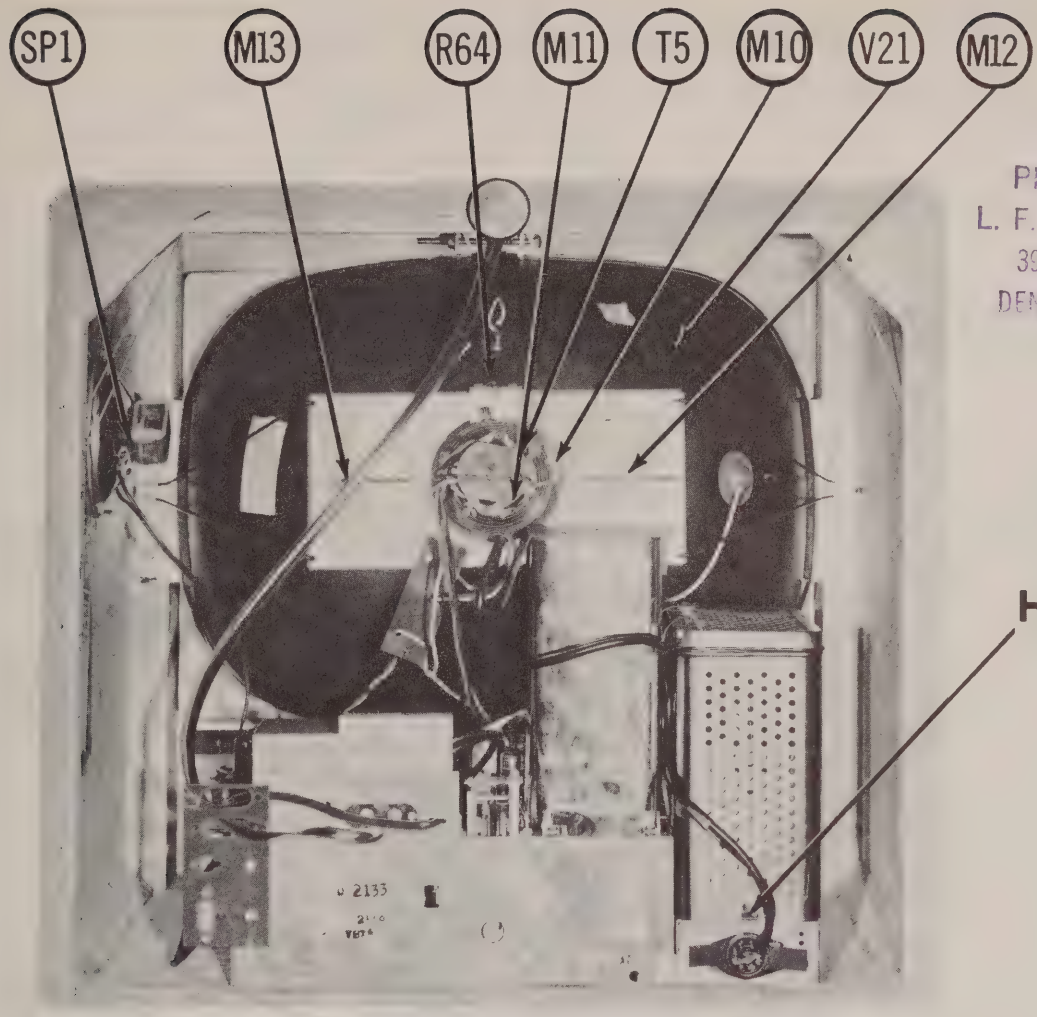
If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components associated with V11 and V12 especially C80. and T6.

BUZZ

Adjust station tuning for best picture and sound. Adjust A15 for minimum buzz. If buzz is still objectionable, substitute V10 and realign audio IF and ratio detector stages.

DISTORTED

Follow procedure outlined under "Weak or No Sound".



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3924 MEADE ST.
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CABINET—REAR VIEW

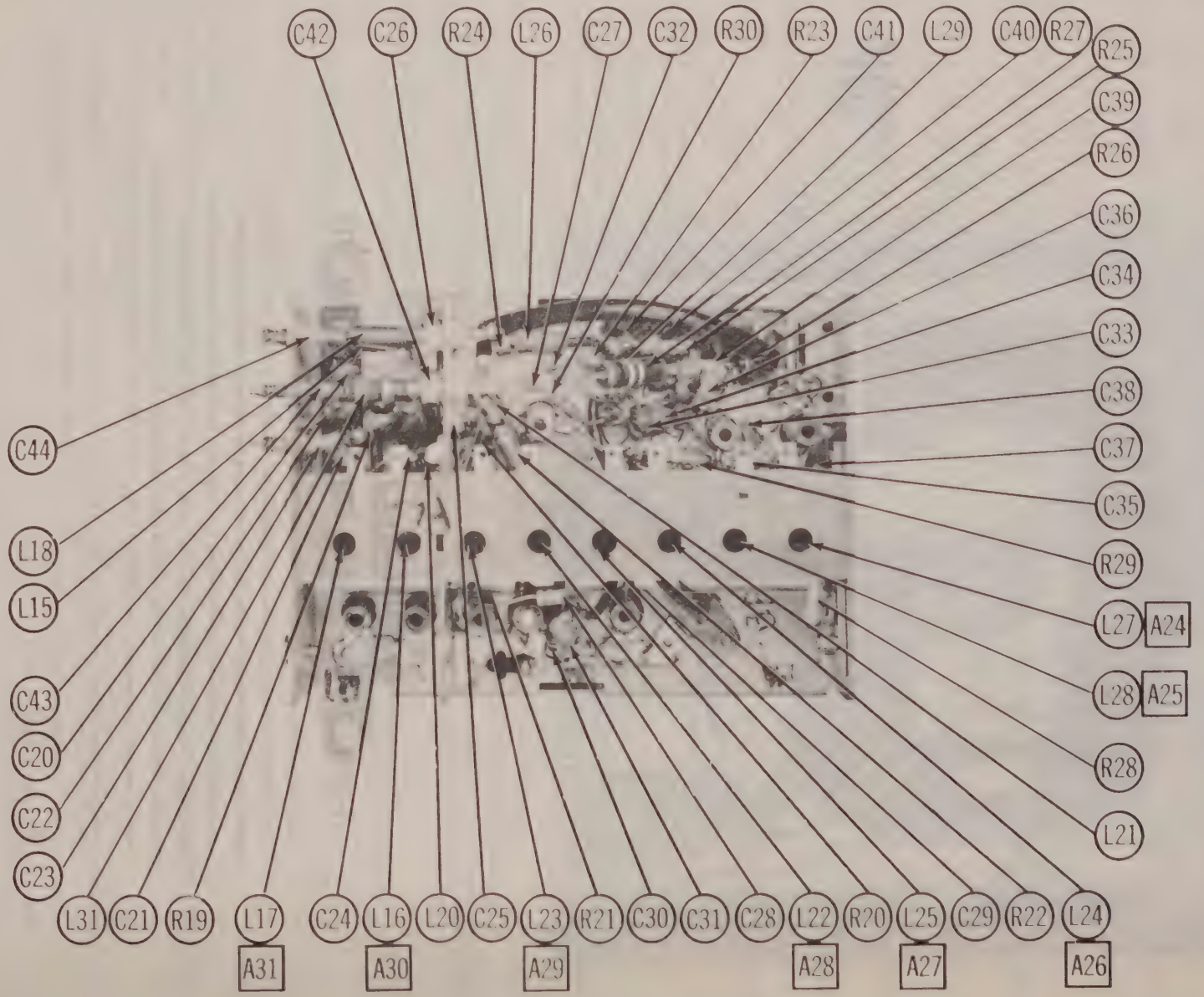
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Set the horizontal hold control to the center of its range. Adjust the horizontal oscillator slug (B1) until picture synchronizes. Continue turning B1 in same direction until picture just loses sync then back off to a point approximately in the center of the effective range of B1. Momentairly interrupt signal by switching off channel and back again. Picture should remain in sync. If necessary readjust B1 until this condition is obtained.

Adjust the horizontal size control for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the sync stabilizer control for the most stable picture.



VHF TUNER-BOTTOM VIEW

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: AIRLINE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2	VHF RF Amp.	6BZ7	6BZ7	9AJ	
V3	Converter	6U8	6U8	9AE	
V4	1st. Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V7	4th. Video IF Amp.	6CB6	6CB6	7CM	
V8	Video Output	25C5	25C5	7CV	
V9	Sound IF Amp.	6AU6	6AU6	7BK	
V10	Ratio Detector	6AL5	6AL5	6BT	
V11	AF Amplifier	6AV6	6AV6	7BT	
V12	Audio Output	25C5	25C5	7CV	
V13	Sync Separator	6BE6	6BE6	7CH	
V14	Sync Amplifier-Vert. Oscillator	12AU7	12AU7	9A	
V15	Vert. Output	6S4	6S4	9AC	
V16	Horiz. AFC	6AL5	6AL5	6BT	
V17	Horiz. Mult.	12AU7	12AU7	9A	
V18	Horiz. Output	25BQ6GT	25BQ6GT	6AM	
V19	Damper	25AX4GT	25AX4GT	4CG	
V20	HV Rectifier	1B3GT	1B3GT	3C	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: AIRLINE PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V21	21YP4	21YP4 21YP4A ①	21YP4 21YP4A ①	21YP4 21YP4A ①	21YP4 21YP4A ①	12L 12L	① Aluminized

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1	100	150	8C-22286	AFHS1-69		XA003		FP116	TVL-1423	
C2	100	150	8C-22285	AFHS1-69		XA003		FP116	TVL-1423	
C3A	▲100	300	8C-22523	AFH3-24		D002		FP335	TVL-3574	
B	■10	300		PRS50/50		BR505				
C	▲60	50								
C4A	■20	300	8C-22524	AFH3-106		C026		FP330.3 TC30	TVL-3634	
B	10	25								
C	▲10	75								
C5	50	450	8C-22544	PRS450/50		BR6045		TC78	TVA-1713	
C6	5			SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	Note 1
C7	5			SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	Note 1
C8	1000		8G-22383	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C9	1000		8G-20878							
C10A	1000		8G-19506	BPD-2X001	DD2-102	DK069	812-001	DCD-521	5HK-2D1	
B	1000									
C11	1000		8G-22120							
C12	1000		8G-22383	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C13	20		8G-21315							
C14	1000		8G-20878							
C15	100		201-22887	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C16	6		8G-20880							
C17	1000		8G-22656	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C18	1000		8G-22656	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C19	1000		8G-22656	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C20	100		8G-19862	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C21	20		8G-22276	SI20NP0	TCZ-20	TZ1.3	NP0K-200	ZT-542	5TCC-Q2	
C22	20		8G-22276	SI20NP0	TCZ-20	TZ1.3	NP0K-200	ZT-542	5TCC-Q2	
C23	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C24	3		8G-22772							
C25	1000									
C26	1000									
C27	.68		8G-12495-1		TCZ-.68	TZ02				
C28	1.7		8G-12495-8							
C29	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5GA-D1	
C30	10		8G-11789	SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C31	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C32	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C33	2.2		8G-12495-4	SI2.2NP0	TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	
C34	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C35	18		8G-22227		TCZ-18	TZ-12	NP0K-180			
C36	2.5		8G-22367							
C37	2.5		8G-19568							
C38	1000		8G-22383	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C39	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C40	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C41	330		8G-17349	SI330	D6-331	TP43	GP2K-331	UC-5333	5GA-T33	
C42	1000									
C43	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C44	1000		8G-20878	EF-001	MFT-1000				503C-D1	
C45	5000		8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C46	680		8G-21105	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C47	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C48	5		8G-12166	SI5NP0	TCZ-4.7	Z011	NP0-831-050	ZT-555	5TCCB-V47	
C49	7		8G-11790			Z014	NP0-831-050			
C50	5000		8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C51	5000		8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C52	680		8G-21105	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C53	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C54	5000		8G-13962	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C55	680		8G-21105	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C56	1000		8G-13201	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	AIRLINE Part No.	AEROVOX Part No.	CENTRALAB Part No.	CORNELL DUBILIER Part No.	ERIE Part No.	MALLORY Part No.	SPRAGUE Part No.	NOTES
C57	5000		8G-13962	BPD-005	DD-502	K080	81-005	DC-525	5HK-D5	
C58	5000		8G-13962	BPD-006	DD-502	K080	81-005	DC-525	5HK-D5	
C59	5000		8G-13962	BPD-005	DD-502	K080	81-005	DC-525	5HK-D5	
C60	5000		8G-13962	BPD-005	DD-502	K080	81-005	DC-525	5HK-D5	
C61	1000		8G-13301	SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C62	5000		8G-13962	BPD-005	DD-502	K080	81-005	DC-525	5HK-D5	
C63	5000		8G-13962	BPD-005	DD-502	K080	81-005	DC-525	5HK-D5	
C64	5000		8G-13962	BPD-005	DD-502	K080	81-005	DC-525	5HK-D5	
C65	5000		8G-13962	BPD-005	DD-502	K080	81-005	DC-525	5HK-D5	
C66	5000		8G-13962	BPD-005	DD-502	K080	81-005	DC-525	5HK-D5	
C67	.047	400	8J-16081	P488-047	DF-503	CUB4347		PT4147	4TM-S47	
C68	5000		8G-13962	BPD-005	DD-502	K080	81-005	DC-525	5HK-D5	
C69	.1	400	8J-16083	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C70	100			SI100	D6-101	TP34	GP1K-101	UC-531	5CA-T1	Note 2
C71	3.3			SI3.3NP0	TCZ-3.3	TZ06	NP0K-3R3	ZT-5533	5TCCB-Y33	Note 3
C72	22			SI22NP0	TCZ-22	TZ14	NP0K-220	ZT-5422	5TCC-Q22	Note 2
C73	47		8G-12198	SI47B750	TCN-47	TN14	N750K-470	NT-5447	5TCU-Q47	
C74	.0022	400	8J-20634	P488-0022	D6-222	CUB6D22	GP2-332-222	PT6222	6TM-D22	
C75	5000		8G-13962	BPD-005	DD-502	K080	81-005	DC-525	5HK-D5	
C76	5000		8G-13962	BPD-005	DD-502	K080	81-005	DC-525	5HK-D5	
C77	5000		8G-22132	SI5000	D6-502	TP64	GP2-333-502	UC-525	5HK-D5	
C78	.01	200	8J-20582	P488-01	D6-103	CUB4S1	GP2-333-103	PT4il	4TM-S1	
C79	.01	300	8J-20582	P488-01	D6-103	CUB4S1	GP2-333-103	PT4il	4TM-S1	
C80	.01	400	8J-16084	P488-01	D6-103	CUB4S1	GP2-333-103	PT4il	4TM-S1	
C81	.01	600	8G-21208	P688-01	D6-103	CUB6S1	GP2-333-103	PT6il	6TM-S1	
C82	.047	400	8J-16081	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C83	.22	300	8J-18082	P488-22		CUB4P22		PT4025	4TM-P22	
C84	.1	200	8J-16085	P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C85	.022	400	8J-19757	P488-022		CUB4S22		PT4122	4TM-S22	
C86	.22	400	8J-18085	P488-22		CUB4P22		PT4022	4TM-P22	
C87A	.002							PT622		
B	.005			♦7A-22376	♦PA-110	♦PC-100	♦li8TM1	♦l405-01	PT625	
C	.005								PT625	♦l01C1
C88	.0047	200	8J-20580	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C89	.047	400	8J-16081	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C90	.047	200	8J-16096	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C91	.1	400	8J-16083	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C92	.01	600	8J-16097	P688-01	D6-103	CUB6S1	GP2-333-103	PT6il	6TM-S1	
C93	22		8G-11892	SI22NT50	TCN-22	TN06	N750K-220	NT-5422	5TCU-Q22	
C94	220	500	8J3-117			22R5Q22				
C95	680	500	8J3-123	1479-0007		IR5T68			MS-37	
C96	220	500	8J3-117			22R5Q22				
C97	680	500	8J3-123	1479-0007		IR5T68			MS-37	
C98	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1	Note 4
C99	.0022	200	8J-20578	P688-0022	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C100	.0039	600	8J-20613	1464-004		IRSD39		MCB5463	MS-34	
C101	82	500	8J3-112			22R5Q82				
C102	330	500	8J3-119	1469-00035		SR5T33				
C103	.22	400		P488-22		CUB4P22		PT4022	4TM-P22	Note 5
C104	100			SI100	D6-101	TP34	GP1K-101	UC-531	5CA-T1	Note 2
C105	47		8G-19863							
C106	470	500	8J3-121	1469-0005		SR5T47		MCB5245	MS-35	
C107	.0015	400	8J-20589	P688-0015	D6-152	CUB6D15	GP2L-152	PT6215	6TM-D15	
C108	.047	400	8J-16081	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C109	.22	400		P488-22		CUB4P22		PT4022	4TM-P22	Note 5
C110	470	1000	8G-21440	SVD15-00047		VT47	IR5KV-471	MCK347	10GA-T47	
C111	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1	Note 4
C112	51									
C113	100	500		1469-0001		SR5T1		MCB235	MS-31	Note 2

Note 1. Some Models use 100MMF in this application (part #8G-22657)
Note 2. Not used in all Models.
Note 3. Some Models use 5MMF in this application (part #8G-12166).
Note 4. Some Models use .22MFD in this application (part #8J-16082).
Note 5. Some Models use .47MFD in this application (part #8J-21506).
♦ Items C87A, C87B, C87C, R86A, R86B, R86C are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	AIRLINE Part No.	IRC Part No.	CLAROSTAT Part No.	CENTRALAB Part No.	MALLORY Part No.	INSTALLATION NOTES
R1A	100KΩ	½	B10B-17275	Q11-128	A47-100K-S	AB-40	U-41	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R1A
R2A	500KΩ	½	B-10B-21456	Q11-133	A47-500K-S	AB-59	U-50	Brightness
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R2A
R3A	1 Meg	½	A-10A-22305	Q13-137	A47-1Meg-S	B8K-70-S	U-53	Volume
B	Shaft		Not Req.	Not Req.	KS8-3	Not Req.	Not Req.	Attach to R3A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R3A
R4A	50000Ω with 10000Ω stop	½	A-10B-22304	Q11-114	A47-5000-S	AB-10	U-14	Vert. Linearity - Note 1
B	Shaft		Not Req.	Not Req.	KS-3	AK- 4	Not Req.	Attach to R4A
R5A	750KΩ with 250K stop	½	A-10B-22307	Q11-133	A47-500K-S			Vert. size - Note 2
B	Shaft		Not Req.	Not Req.	KS-2			Attach to R5A
R6	2500Ω	2	A-10B-22311	Q17-111				Picture - wire wound
R7A	3 Meg	½	B10B-17318	Q11-140	A47-2.5Meg-S	AB-84	U-57	Sync stabilizer
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R7A
R8A	3 Meg	½	B10B-17318	Q11-140	A47-2.5Meg-S	AB-84	U-57	Vert. hold
B	Shaft		Not Req.	Not Req.	KS3-3	AK-4	Not Req.	Attach to R8A

Note 1. Connect a 1000Ω resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down)

Note 2. Connect a 350KΩ resistor in series with the left hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	AIRLINE Part No.	IRC Part No.	NOTES
R9	470 KΩ	½	9B1-29	BTS-470K	
R10	22Ω	½	9B1-42	BTS-22	
R11	15Ω	½	9B1-40	BTS-15	
R12	56Ω	½	9B1-47	BTS-56	
R13	4700Ω	½	9B1-70	BTS-4700	
R14	22Ω	½	9B1-42	BTS-22	
R15	56Ω	½	9B1-47	BTS-56	
R16	56Ω	½	9B1-47	BTS-56	
R17	220Ω	½	9B1-54	BTS-220	
R18	470KΩ	½	9B1-29	BTS-470K	
R19	10KΩ	½	9B1-74	BTS-10K	
R20	100KΩ	½	9B1-86	BTS-100K	
R21	10Ω	½	9B1-38	BTS-10	
R22	1000Ω	½	9B1-62	BTS-1000	
R23	22KΩ	½	9B1-78	BTS-22K	
R24	220KΩ	½	9B1-27	BTS-220K	
R25	33KΩ	½	9B1-80	BTS-33K	
R26	27KΩ	½	9B1-79	BTS-27K	
R27	10KΩ	1	9B2-74	BTA-10K	
R28	10KΩ	½	9B1-74	BTS-10K	
R29	2200Ω	½	9B1-66	BTS-2200	
R30	1500Ω	½	9B1-14	BTS-1500	
R31	22KΩ	2	9B4-78	BTP-22K	
R32	12KΩ	2	9B4-75	BTP-12K	Note 1
R33	22KΩ	½	9B1-78	BTS-22K	
R34	6800Ω	½	9B1-72	BTS-6800	
R35	1000Ω	½	9B1-62	BTS-1000	
R36	82Ω	½	9B1-49	BTS-82	
R37	1000Ω	½	9B1-62	BTS-1000	
R38	1000Ω	½	9B1-62	BTS-1000	
R39	47KΩ 5%	½	9B1-199	BTS-47K 5%	
R40	1000Ω	½	9B1-62	BTS-1000	
R41	56Ω	½	9B1-48	BTS-68	
R42	27KΩ 5%	½	9B1-193	BTS-27K 5%	
R43	1000Ω	½	9B1-62	BTS-1000	
R44	1000Ω	½	9B1-62	BTS-1000	
R45	47Ω	½	9B1-46	BTS-47	
R46	47KΩ 5%	½	9B1-199	BTS-47K 5%	
R47	1000Ω	½	9B1-62	BTS-1000	
R48	180Ω	½	9B1-53	BTS-180	
R49	22KΩ	1	9B2-78	BTA-22K	
R50	10KΩ	1	9B2-74	BTA-10K	
R51	15KΩ 5%	½	9B1-197	BTS-15K 5%	
R52	5600Ω	½	9B1-71	BTS-5600	
R53	3900Ω	½	9B1-69	BTS-3900	
R54	10KΩ	½		BTS-10K	Note 6
R55	150KΩ	½	9B1-88	BTS-150K	Note 2
R56	15KΩ	2	9B1-76	BTS-15K	
R57	3300Ω	2	9B4-68	BTP-3300	
R58	3300Ω	2	9B4-68	BTP-3300	
R59	4700Ω	½	9B1-70	BTS-4700	
R60	100KΩ	½	9B1-86	BTS-100K	
R61	22KΩ	½	9B1-78	BTS-22K	Note 3
R62	5600Ω			BTS-5600	Note 4
R63	1000Ω	½	9B1-62	BTS-1000	
R64	220KΩ	½		BTS-220K	

ITEM No.	RATING OHMS	RATING WATT	AIRLINE Part No.	IRC Part No.	NOTES
R65	100KΩ	½	9B1-86	BTS-100K	
R66	120Ω	½	9B1-51	BTS-120	
R67	8200Ω	2	9B4-73	BTP-8200	
R68	47Ω	½	9B1-46	BTS-47	
R69	22KΩ	½	9B1-78	BTS-22K	
R70	22KΩ	½	9B1-78	BTS-22K	
R71	10 Meg	½	9B1-110	BTS-10 Meg	
R72	470KΩ	½	9B1-94	BTS-470K	Note 5
R73	470KΩ	½	9B1-94	BTS-470K	
R74	120Ω	½	9B2-51	BTA-120	
R75	1 Meg	½	9B1-98	BTS-1 Meg	
R76	1 Meg	½	9B1-98	BTS-1 Meg	
R77	68KΩ	½		BTS-68K	
R78	1.5Meg	½	9B1-100	BTS-1.5Meg	
R79	47KΩ	2	9B4-82	BTP-47K	
R80	15KΩ	½	9B1-76	BTS-15K	
R81	18KΩ	½	9B1-77	BTS-18K	
R82	47KΩ	½	9B1-82	BTS-47K	
R83	2.2Meg	½	9B1-102	BTS-2.2Meg	
R84	100KΩ	½	9B1-86	BTS-100K	
R85	100KΩ	½	9B1-86	BTS-100K	Note 7
R86A	22KΩ			BTS-22K	
B	82000Ω		♦7A-22376	BTS-8200	
C	8200Ω			BTS-8200	
R87	100KΩ	½	9B1-86	BTS-100K	
R88	3.3Meg	½	9B1-102	BTS-3.3Meg	
R89	6.8Meg	½	9B1-108	BTS-6.8Meg	
R90	100KΩ	½	9B1-86	BTS-100K	
R91	2.2Meg	½	9B1-102	BTS-2.2Meg	
R92	180KΩ	2	9B4-99	BTA-180K	
R93	1000Ω	½	9B1-62	BTS-1000	
R94	1000Ω	½	9B1-62	BTS-1000	
R95	150KΩ	½	9B1-88	BTS-150K	
R96	2.2Meg	½	9B1-102	BTS-2.2Meg	
R97	150KΩ	½	9B1-88	BTS-150K	
R98	2.2Meg	½	9B1-102	BTS-2.2Meg	
R99	470KΩ	½	9B1-94	BTS-470K	
R100	68KΩ	½	9B1-84	BTS-68K	
R101	2200Ω	½		BTS-2200	
R102	10KΩ	1	9B2-74	BTA-10K	
R103	150KΩ	½	9B1-88	BTS-150K	
R104	330KΩ	½		BTS-330K	
R105	680KΩ	½	9B1-96	BTS-680K	
R106	680KΩ	½	9B1-96	BTS-680K	
R107	150KΩ	½	9B1-88	BTS-150K	
R108	100Ω	½	9B1-50	BTS-100	
R109	470KΩ	½	9B1-94	BTS-470K	
R110	4700Ω	2	9B4-70	BTP-4700	
R111	1800Ω	1	9B2-65	BTA-1800	Note 8
R112	10KΩ	2	9B4-74	BTP-10K	
R113	5.6Ω	½			
R114	47Ω	15	9M-22837		Note 8
R115	9.1Ω		45M-22301		
R116A	1500Ω	10	9M-22375		
B	2300Ω	10			
R117	3.9Ω	½	9C1-1070		

Note 1. Some models may use a 22KΩ resistor in this application.
Note 2. Some models may use a 47KΩ resistor in this application.
Note 3. Some models may use a 1800Ω resistor in this application.
Note 4. Some models may use a 3300Ω resistor in this application.
Note 5. Some models may use a 220KΩ resistor in this application.
Note 6. Not used in all models.
Note 7. Some models may use a 47KΩ resistor in this application.
Note 8. Models that use a 6AX4 as V9 may use a 150Ω resistor in this application.
♦ Items R86A, R86B, R86C, C87A, C87B, C87C are combined in one unit.

TRANSFORMER (FILAMENT)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	AIRLINE Part No.	Stancor Part No.	Merit Part No.	Triad Part No.	RCA TYPE No.	Halldorson Part No.	Thordarson Part No.
T1	117VAC ② .43A	6.3VAC ③ 5.7A		12D22160-1		P-2947 ① ②	F-182X① ②			

① Drill one new mounting hole.
② Tape center tap on 6.3V winding.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	AIRLINE Part No.	Stancor Part No.	Merit Part No.	Triad Part No.	RCA TYPE No.	Halldorson Part No.	Thordarson Part No.
T3	Vert. Osc. Trans.	12M-18241	A-8125	A-3003	A-97X	209T1 ①	B6702	TV-24A87 ①
T3	Horiz. Output Trans.	20I-22396-1 20I-22396 ②						
T4	Vert. Output Trans.	12C-20761-2	A-8141	A-3039	A-102X		Z1805	T-26854
T5A	Yoke-Horiz.(8.4MH)	20I-22697 ④	DY-8A ③	MDF-70③	Y-12 ③		DF601 ①	
B	Yoke - Vert. (45MH)							

① Drill one new mounting hole.
② Alternate horizontal output trans.
③ Use original deflection coil network.
④ Includes C112, R93 and R94.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	AIRLINE Part No.	Stancor Part No.	Merit Part No.	Triad Part No.	Halldorson Part No.	Thordarson Part No.	NOTES
T6	2.16KΩ	3.1Ω	12C22508	A-3876	A-3928	S-2X	21001	TS-24850	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	AIRLINE Part No.	JENSEN Part No.	QUAM Part No.	NOTES
SP1	5"	PM	3.1Ω	18A21216	ST-105 Mod P5-X	5A07	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI	DC RES. SEC.	AIRLINE Part No.	MEISSNER Part No.	MERIT Part No.	MILLER Part No.	NOTES
L1	UHF Ant. Coil	0Ω						
L2	UHF Ant. Coil	0Ω						
L3	UHF Ant. Coupling Loop	0Ω CT		62D-22401				
L4	UHF RF Coupling Loop	0Ω (Tapped)		62D-22254				
L5	UHF Mixer Coupling Loop	0Ω		62D-22360				
L6	Fil. Choke	0Ω		16A-22411				
L7	Cathode Choke	0Ω		16A-22411				
L8	RF Choke	1.1Ω		16A-22362				
L9	UHF IF Output Coil	0Ω CT		13B-22410				
L10	IF Trap	0Ω		13M-22425				Wound on 82MMF Cap.
L11	VHF Ant. Trans.	.7Ω	.7Ω	13M-22482				
L12	VHF Ant. Trans.	.7Ω	.7Ω	13M-22482				
L13	IF Trap	0Ω		13M-22425				Wound on 82MMF Cap.
L14	IF Trap	0Ω		13M-22702				Wound on 82MMF Cap.
L15	RF Choke	.1Ω		20I-20405				
L16	VHF Ant. Coil	0Ω		13M-22328				Low Band, Core part #51A-22408
L17	VHF Ant. Coil	0Ω		13E-17140				High band, core part #51A-22409
L18	Fil. Choke	.1Ω		20I-20405				
L19	Fil. Choke	.2Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L20	Neutr.Coil	0Ω		13M-22044				
L21	RF Choke	.9Ω		16A-17128				
L22	RF Coil	0Ω		13M-22325				Low band, core part #51A-22407
L23	RF Coil	0Ω		13E-17140				High band, core part #51A-22409
L24	Mixer Grid Coil	0Ω		13M-22327				Low band, core part #51A-22405
L25	Mixer Grid Coil	0Ω		13E-17140				High Band, core part #51A-22409
L26	Fil. Choke	.1Ω		16A-20777				
L27	Osc.Coil	0Ω		13M-22703				Low Band, core part #51A-22406
L28	Osc.Coil	0Ω		13E-17140				High Band, core part #51A-22404
L29	RF Choke	0Ω		13M-22736				
L30	Conv.Plate	.2Ω	.2Ω	13B-22426				
L31	RF Choke	2.4Ω		20I-15608	19-3036	TV-180	4626	20 Microhenries
L32	RF Choke	2.2Ω		20I-15608	19-3036	TV-180	4626	20 Microhenries
L33	1st.Video IF Grid	.2Ω	.2Ω	20I-22456	17-4531 ¶		6232 #	Includes trap & 1KΩ resistor
L34	Fil. Choke	.2Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L35	1st. Video IF Plate	.2Ω		20I-22562	17-4504 ♦		6231 **	Includes 3.9 KΩ resistor & 470MMF Cap.
L36	RF Choke	2.3Ω		20I-15608	19-3036	TV-180	4626	20 Microhenries
L37	41.25MC Trap	0Ω		20I-22565				Part number includes C48
L38	47.25MC Trap	0Ω		20I-22588	20-1047			Part number includes C49
L39	2nd. Video IF	.3Ω		20I-22570	17-4504 ♠		6234 ♦	
L40	Fil. Choke	.1Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L41	Fil. Choke	.1Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L42	RF Choke	2.2Ω		20I-15608	19-3036	TV-180	4626	20 Microhenries
L43	3rd. Video IF	.1Ω		20I-22426	17-4503 ♠		6233 ♠	Includes capacitors
L44	RF Choke	1.7Ω		20I-15608	19-3036	TV-180	4626	20 Microhenries
L45	RF Choke	2.2Ω		20I-15608	19-3036	TV-180	4626	20 Microhenries
L46	4th. Video IF	.1Ω		20I-22435	17-4505 ♦		6232 ♦	Includes trap & 7MMF Cap.
L47	RF Choke	2.3Ω		16A-23024	19-5022	TV-180	6152	20 Microhenries
L48	Fil. Choke	.2Ω		16A-17937	19-3001	TV-189	6175	3 Microhenries
L49	RF Choke	2.3Ω		20I-15608	19-3036	TV-180	4626	20 Microhenries
L50	5th.Video IF	.5Ω	.5Ω	13B-22430				Includes capacitors & Series Peak.Coil
L51	Series Peaking Coil	1.7Ω		16A-22427	19-1004		4610	7.5 Microhenries
L52	Shunt Peaking Coil	23Ω		16A-19365	19-3500		4648	410 Microhenries
L53	Series Peaking Coil	6.5Ω						278 Microhenries, Not used in all Models.
L54	Series Peaking Coil	5.5Ω		16A-20021	19-3125		4644	130 Microhenries
L55	Shunt Peaking Coil	10Ω		16A-19486			4648	380 Microhenries
L56	Shunt Peaking Coil	10Ω		16A-19486			4648	380 Microhenries
L57	Sound IF	1.6Ω		20I-22581	17-3400	TV-151	4649	Part no. includes C71, C73 & R65

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L58	Ratio Det.	7Ω	1.5ΩCT	13M-22303	17-3497	TV-115	6205	Tertiary winding -.75Ω
L59	Horiz.Osc.	75Ω		201-22302	19-1575	TV-163 †	6210 †	Part number includes C100.
L60	4.5MC Trap	1Ω			20-1004	TV-151	1470	Not used in all Models.

‡ Detune trap, add 3.9KΩ resistor & 470MMF Capacitor externally, cut out chassis hole and drill mounting holes.
** Use on winding only, add 3.9KΩ resistor & 470MMF Capacitor externally, cut out chassis hole and use clip mounting.
▲ Use one winding only, detune trap, add 15MMF capacitor externally, cut out chassis hole and use clip mounting.
■ Detune trap, add 15MMF capacitor externally, cut out chassis hole and drill mounting holes.
♦ Use primary and trap windings only, add 7MMF capacitor externally, cut out chassis hole and use clip mounting.
* Add 7MMF capacitor externally, cut out chassis hole and drill mounting holes.
† Enlarge mounting hole.
◓ Detune trap, cut out chassis hole and drill mounting holes.
Use one winding only, cut out chassis hole and use clip mounting.
¶ Add 1KΩ resistor across primary winding, disconnect R34 , cut out chassis hole and drill mounting holes.
§ Add 1KΩ resistor across primary winding, cut out chassis hole and use clip mounting.

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT · 1000 ~)	REPLACEMENT DATA: AIRLINE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L61	.300A	70Ω	2.92HY	16A21214	C-2326		C-17X	C5037	

SELENIUM RECTIFIER

ITEM No.	RATING: CURRENT	REPLACEMENT DATA: AIRLINE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	SELETRON PART No.	NOTES
M1	.300ADC	21J20097	1023A	RS350	6S350	350		
M2	.300ADC	21J20097	1023A	RS350	6S350	350		

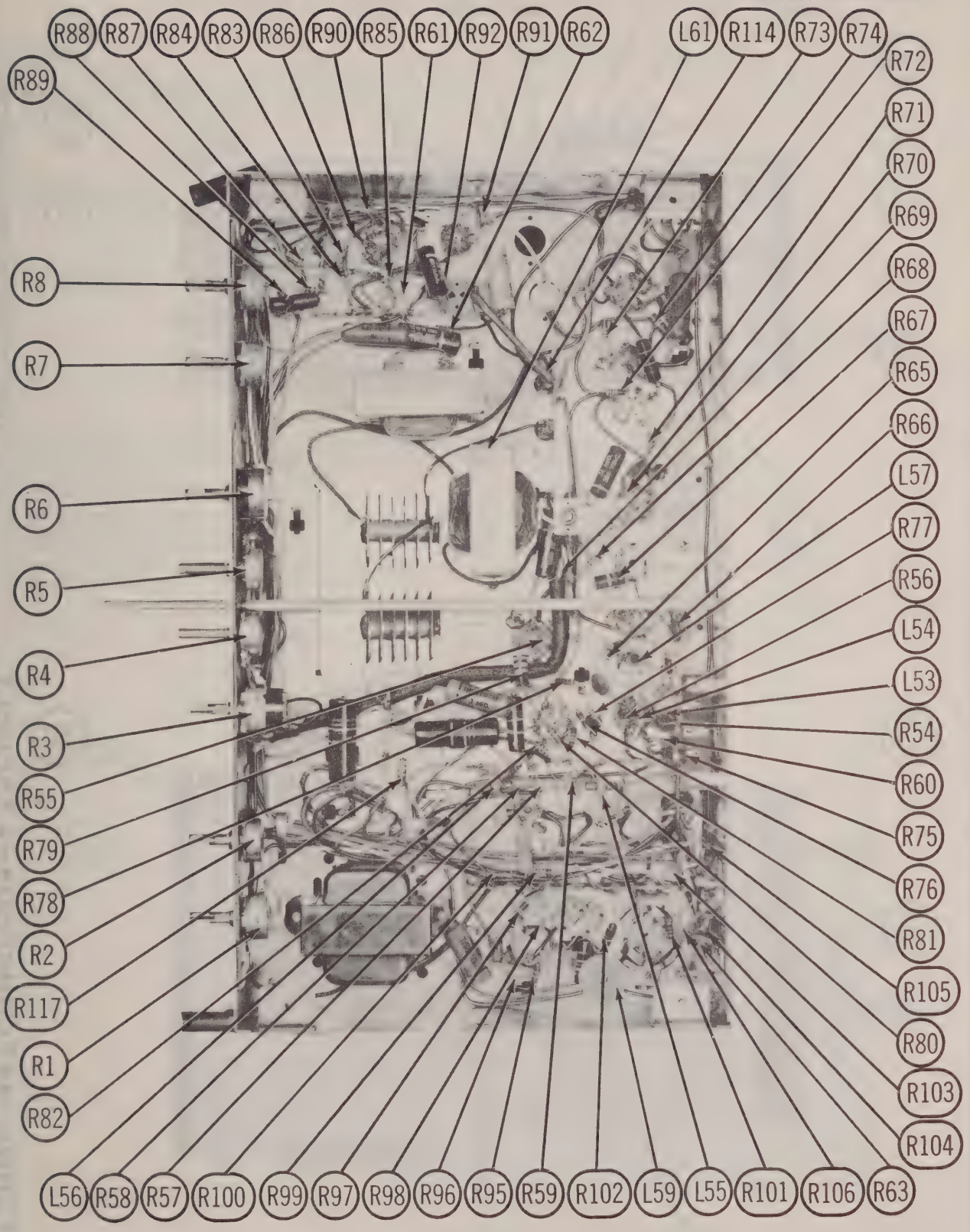
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: AIRLINE PART No.	SYLVANIA PART No.	FEDERAL PART No.	NOTES
M3	1N82	8M-22649	1N82 or 1N82A		UHF mixer (clip-in)
M4	CK706	8M-21959	1N60	1N60 or 1N64A	Video detector (pigtail)

MISCELLANEOUS

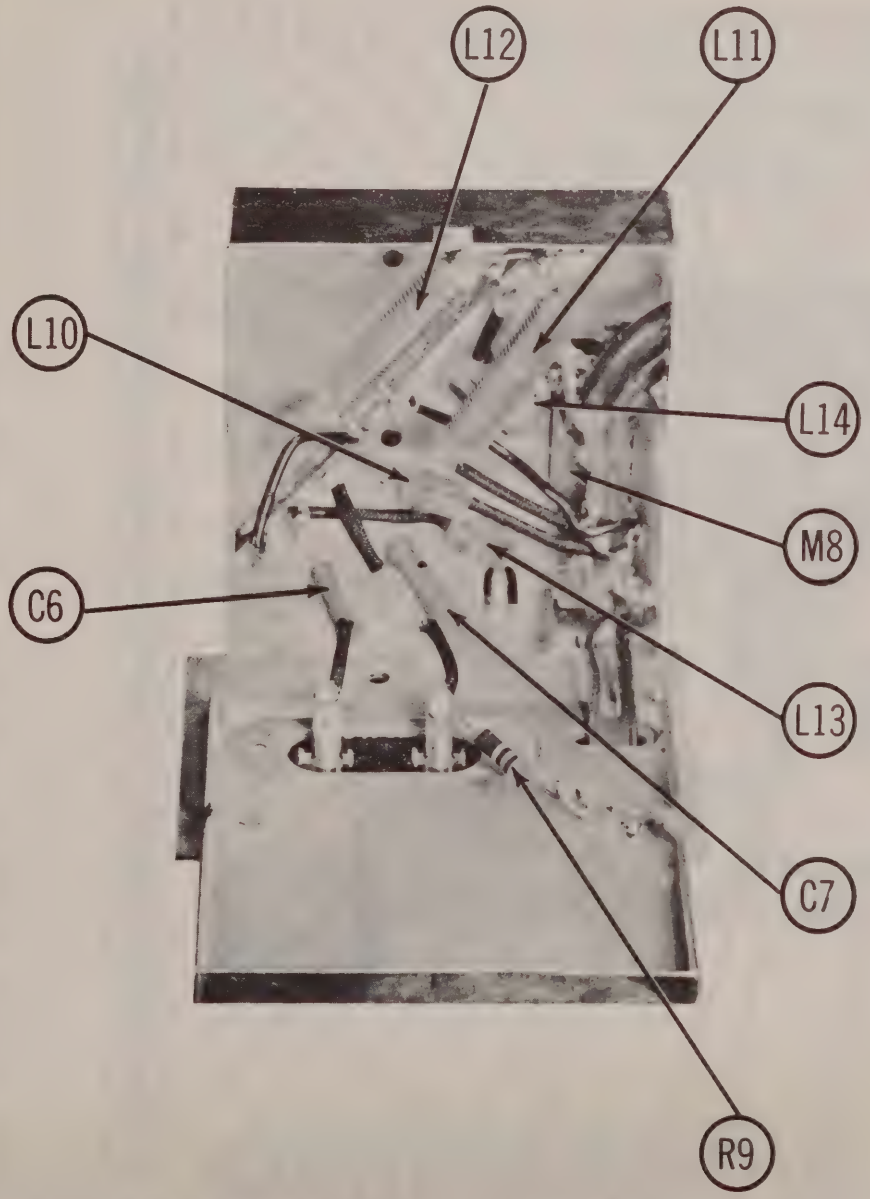
ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M5	Dial light		# 47 bayonet (2 used)
M6	Tuner	C2A-22118	UHF
M7	Tuner	C2C-22190	VHF
M8	Switch	20B-22422	UHF-VHF changeover (ANT)
M9	Switch	20M-22462	UHF Osc.
M10	Centering magnet	16M-20697	
M11	Ion trap	16M-19906	
M12	Correction magnet	16M-22602	Horiz. Linearity
M13	Correction magnet	16M-22607	Anti-pin-cushion
M14	Switch	20M-22462	UHF Osc.
A12	Trimmer cap	8E-22419	1st Video IF coupling
	Trimmer cap	8E-18508	Sound discriminator
	Safety Glass	30M-21485	Tuning
	Knob	5B-22613	(2) Picture & volume
	Knob	5B-20755-29	Star knob (4 used)
	Escutcheon Assy.	200-22558	

PROPERTY OF
U. S. NAVY

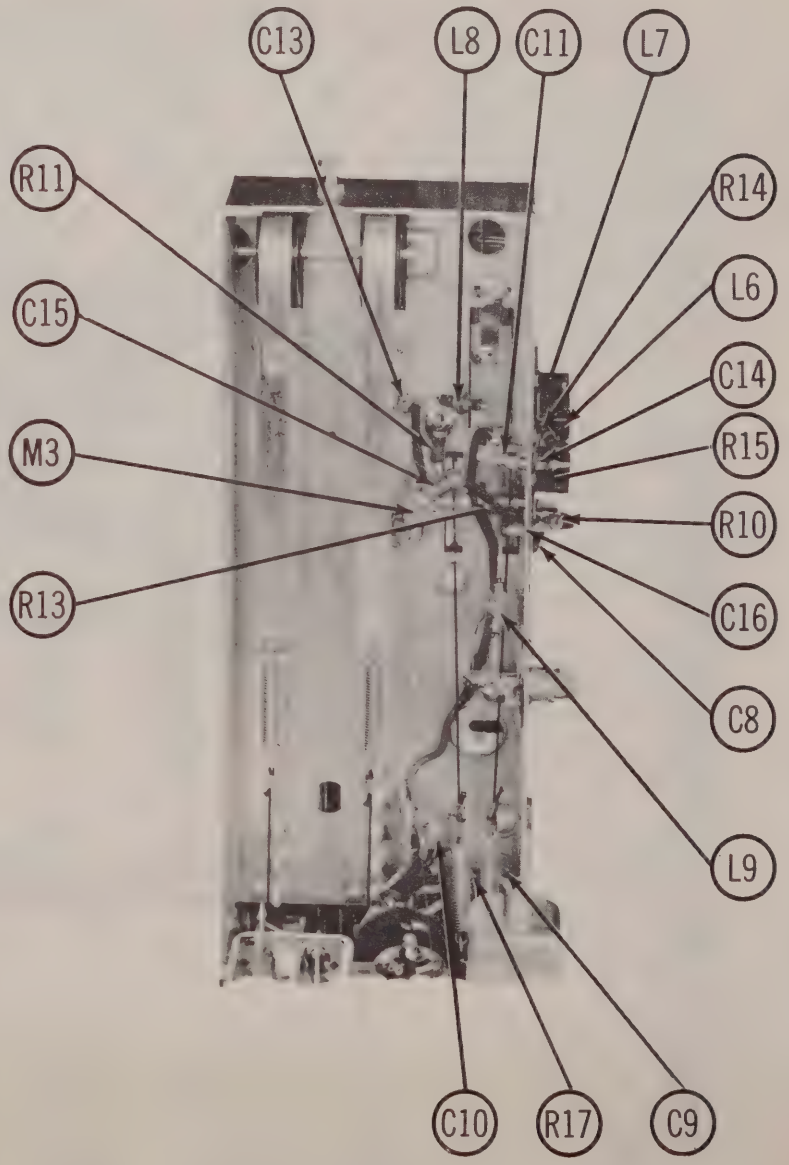


SWEEP CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

AIRLINE
MODEL 45BR-3186A



ANTENNA MATCHING SUB-ASSEMBLY



UHF TUNER SUB ASSEMBLY

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

POWER

DEAD SET

If only V18, V19, V12 and V8 filaments light, check T1. If no filaments light, check AC interlock assembly and switch on volume control. If all filaments light, check R115, M1, M2 and other associated B+ filter components.

SMALL AND/OR DIM PICTURE

Check M1 and M2. Check C1, C2, C3A, and other B+ filter network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V17, V18, V19 and V20. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check R113, T5A, T3 and other associated components.	Check C106, C107, R107, R109 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V17, V18, V19 and V20. Measure B+.

If Satisfactory	If Unsatisfactory
Follow procedure outlined under "Loss of High Voltage".	Follow procedure outlined under "Small and/or Dim Picture".

BLOOMING

Check by substitution V20, V19 and V18. Check R113, T3, T5A, C1, C2, C3A, M1, M2, C5, R112, picture tube and other associated components.

GENERAL

RASTER SOUND NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER PICTURE NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER NO PICTURE NO SOUND

Check by substitution V2, V3, V4, V5, V6, V7 and V8. Check video detector assembly. Check components associated with the video IF and RF tuner.

NO RASTER NO SOUND

Follow procedure outlined under "Dead Set".

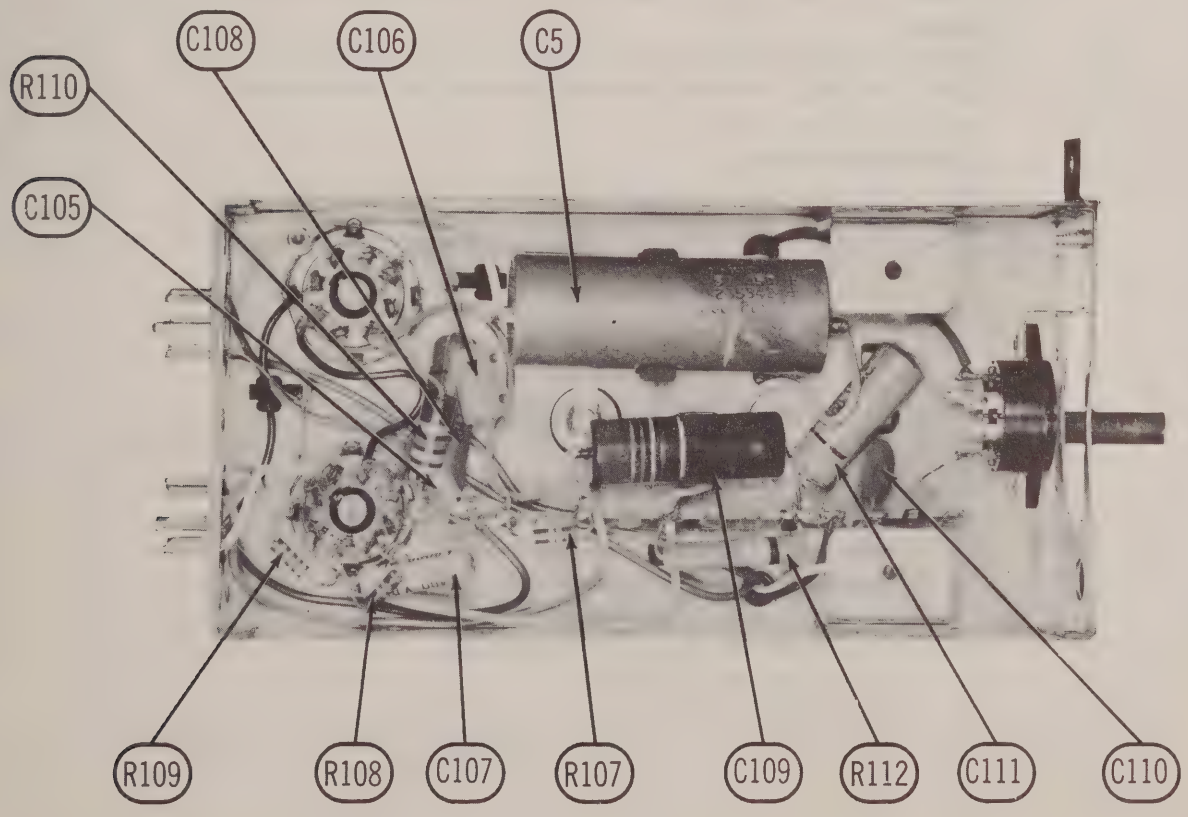
KEYSTONE EFFECT

Check T5, R93, R94 and C112.

INTERMITTENT STREAKS

Check video signal for interference pulses. Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



POWER SUPPLY CHASSIS-BOTTOM VIEW

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustments of RF tuner oscillator adjustments, it is necessary to remove the chassis from the cabinet. (See Disassembly instructions).

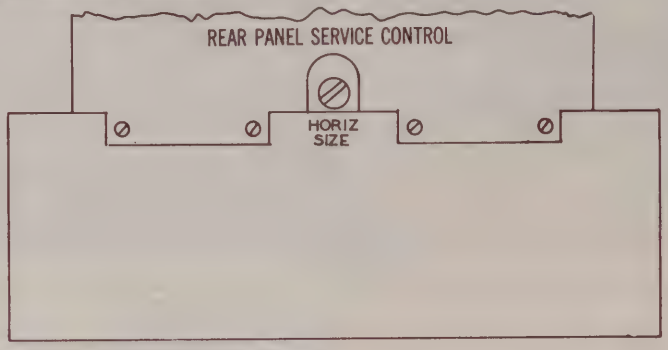
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove three (3) wood screws holding metal strip at the bottom of safety glass. Remove metal strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal oscillator slug (L59) until picture synchronizes horizontally. (For location see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L58) located on top of chassis. (See tube placement chart).

FUSES

One fuseable resistor is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting a magnetic ring around the neck of the picture tube located flush against the yoke. Turn the disc-like knob and at the same time rotate the ring around the tube until picture is properly centered.

ANTI-PIN CUSHION ADJUSTMENT

Reduce the picture size so that the sides of the raster are visible, and position the magnets so that all sides are straight lines and the corners are at right angles.

DISASSEMBLY INSTRUCTIONS

1. Remove 1 push on type control knob and 1 metal balance control knob from front panel.
2. Remove 4 metal screws from front dial assembly. Remove front dial assembly.
3. Remove 6 push on type control knobs from front of chassis.
4. Disconnect built-in antennas (VHF & UHF).
5. Remove 6 wood and 1 metal screws. Remove rear cover.
6. Disconnect speaker plug, yoke plug, CRT socket and HV plug.
7. Remove 8 chassis bolts. Remove chassis.
8. Remove 2 speaker nuts. Remove speaker.

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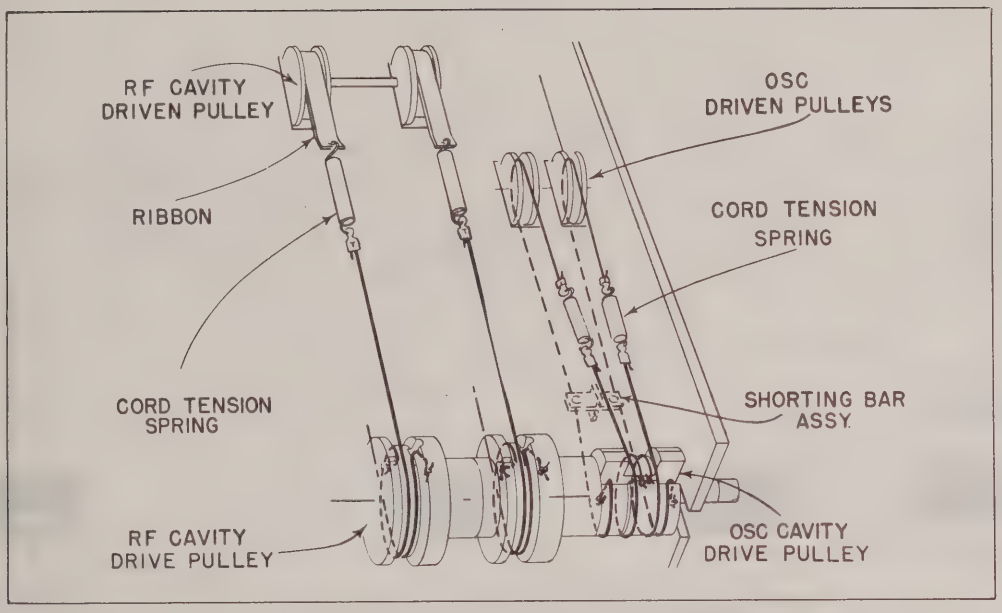
DENVER, COLORADO



UHF DRIVE CORD STRINGING

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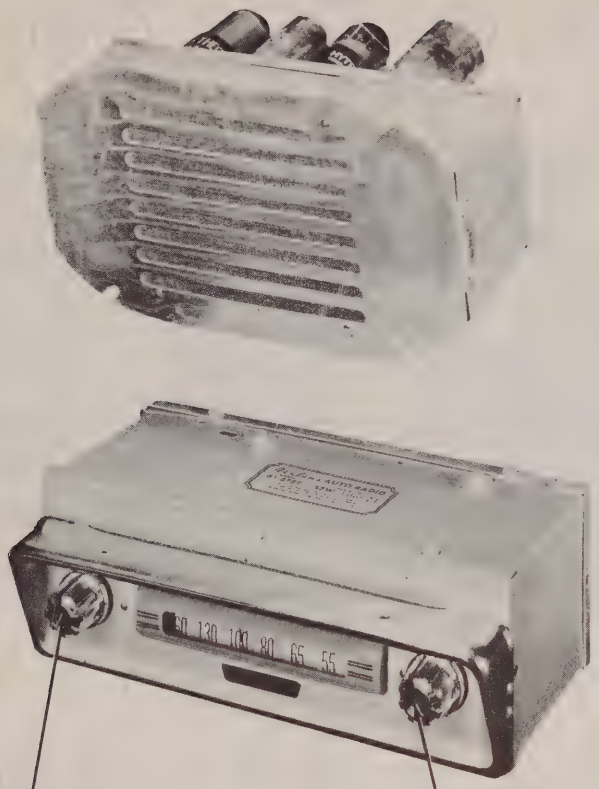

AIRLINE
MODEL 61-6787

TRADE NAME	Airline Model 61-6787 (For 1952 Ford Automobiles)
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Ill.
TYPE SET	Battery Operated Custom Built Automobile Superheterodyne Receiver
TUBES (Six)	Types 6BA6 RF Amp., 6BE6 Conv., 6BA6 IF Amp., 6AV6 (or) 6AT6 Det. -AVC-AF Amp., 6V6GT Audio Output, 6X5 Rectifier
POWER SUPPLY	6 Volt Storage Battery — RATING 3.9 Amp. @ 6.3 Volts DC
TUNING RANGE—BROADCAST	538-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

With tuning gang fully closed set dial pointer to the left edge of "55" on the dial. The volume control should be at maximum position. Attenuate generator output to maintain 1.8 volts on output meter. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (2). Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	68MMF	High side thru 68MMF to antenna receptacle. Low side to chassis.	1600KC	"	"	A5	Adjust for maximum output. If range of A5 is insufficient, adjust trimmer on opposite end of stator plates.
3.	"	"	1400KC	Tune to 1400KC signal.	"	A6, A7	"
4.	"	"	600KC	Tune to 600KC signal.	"	A8, A9	Adjust for maximum output. Repeat step 3.

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PARTS LIST AND DESCRIPTIONS

AIRLINE MODEL 61-6787

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		AIRLINE PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amplifier	6BA6	6BA6	7BK	
V4	Det-AVC AF Amp.	6AV6	6AV6	7BT	6AT6 used in some sets
V5	Audio Output	6V6GT	6V6GT	7S	
V6	Rectifier	6X5	6X5	6S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	■ 20	350	CE-86	AFH3-107		C080		FP345. 8	TVL-3739	
B	▲ 20	350								
C	20	25								
C2	047	200	C503-2	P288-047	DF-503	PJ2S47		PT4147	2TM-S47	
C3	047	200	C503-2	P288-047	DF-503	PJ2S47		PT4147		
C4	100		CC101	S1100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C5	047	400		P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C6A	220		† PC-151	† PA-113-2	† PC-151	† 116TM2	† 1408-02		† DT-2	
B	5000									
C	5000									
D	250									
E										
C7	01	600		P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	
C8	005	200	C502-6	P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	
C9	. 47	100	CC-504-1	VHC-36		PJ2P5		RF480	HC-2	
C10	. 5	100	CC-504-1	VHC-36		PJ2P5		RF480	HC-2	
C11	008	1600	C802-16	P1688-008		CUB16D8		PT1628	MB-D8	

† Items C6A, C6B, C6C, C6D, C6E, R8A, R8B, and R8C are combined in one unit. When replacing items individually items C6D and C6E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	AIRLINE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	750KΩ with 20KΩ stop	½	RV-100	* Q13-137	*A47-750K-Z	*B-70-S	*U-51	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-20	Not Req.	US-26	Attach to R1A

* Connect a 20KΩ resistor in series with the left hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end, terminals down).

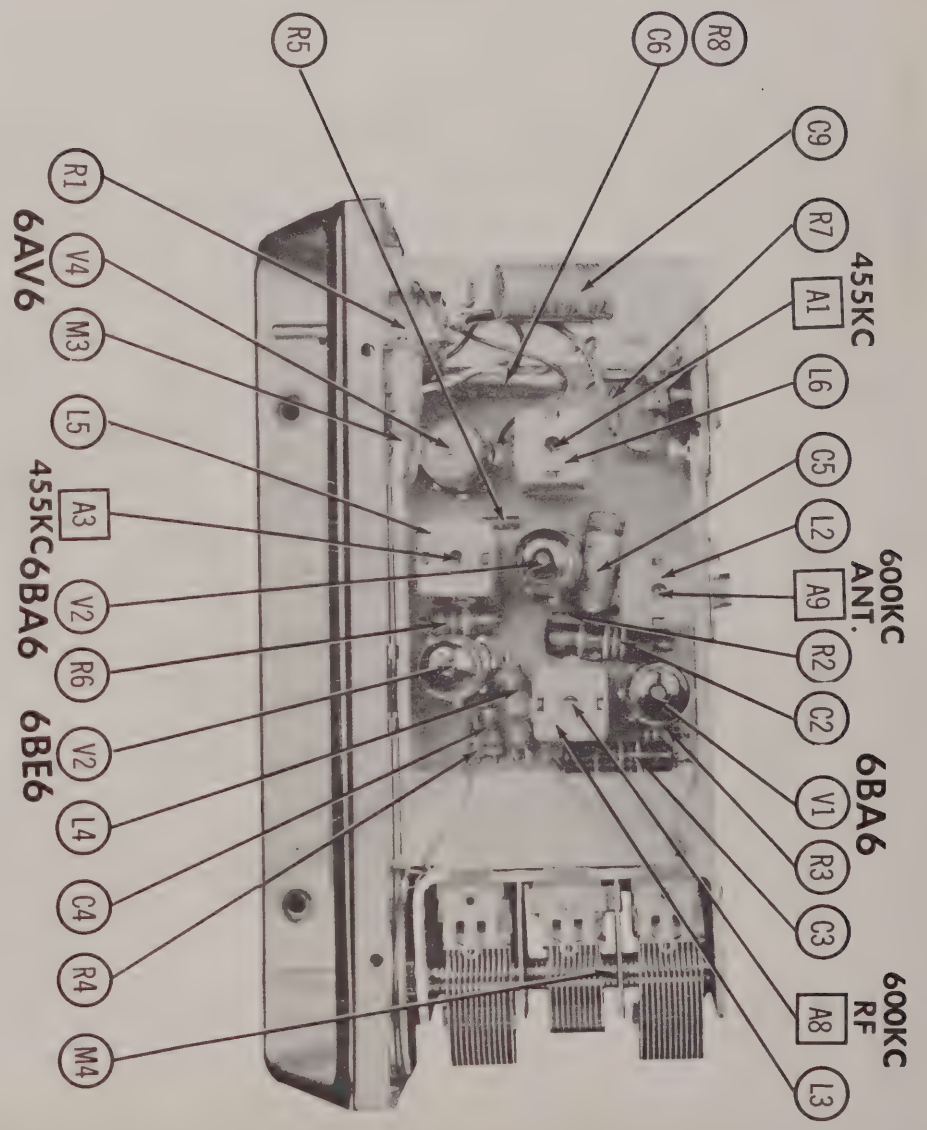
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R2	1. 2Meg	½	R125	BTS-1. 2Meg	
R3	330Ω	½	R331	BTS-330	
R4	22KΩ	½	R223	BTS-22K	
R5	1500Ω	½	R152	BTS-1500	
R6	22KΩ	2	R223-2	BTB-22K	
R7	2. 2Meg	½	R225	BTS-2. 2Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R8A	6. 8Meg	½	♦ PC-151	BTS-6. 8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	
R9	470KΩ	½	R474	BTS-470K	
R10	330Ω	½	R331	BTS-330	
R11	1000Ω	1	R102-1	BTA-1000	
R12	100Ω	½		BTS-100	Note 1
R13	100Ω	½		BTS-100	Note 1

♦ Items R8A, R8B, R8C, C6A, C6B, C6C, C6D, C6E are combined in one unit.
Note 1. Some models may use a 68Ω resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	AIRLINE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	6.3VCT @ 2A	430VCT .046ADC			TV-100		P-2971	V-16K	V-3801	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AIRLINE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	5.1KΩ	3.2Ω	Part of speaker	A-3877	A-2930	S-3X	Z1001	24S51	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	AIRLINE PART No.	JENSEN PART No.	QUAM PART No.	
SP1	5 1/4"	PM	3.2Ω	PM705B	ST-803 Mod. P525-V	52A1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. AF Choke	1.1Ω		L200	19-1005 *		4624	Wound on a 10MMF cap.
L2	Ant. Coil	13Ω	7Ω	57FB-3				
L3	RF Coil	88Ω	6.5Ω	57FB-4				
L4	Osc. Coil	8.5Ω		L201	14-1033 ■	BC-381 ■	71-Osc. ■	Tapped @ 1Ω
L5	Input IF	18Ω	18Ω	1655-16	16-6758	BC-352	12-C1	
L6	Output IF	18Ω	18Ω	1655-16	16-6758	BC-353	12-C2	
L7	Fil. Choke	0Ω		L203		BC-537	5221	
L8	Vib. Hash Choke	0Ω		L202		BC-537	5221	

* Connect in series with 10MMF capacitor.
■ Drill mounting hole.

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				AIRLINE PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interrupter	6.3V	115~	V-83	5301	859	5301	

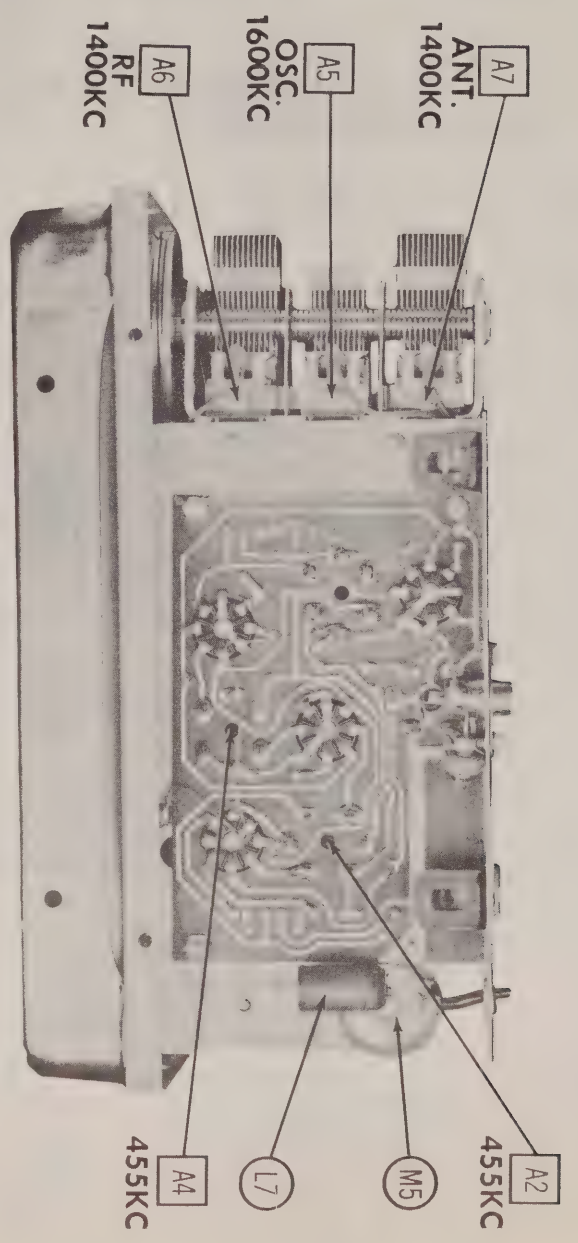
FUSES

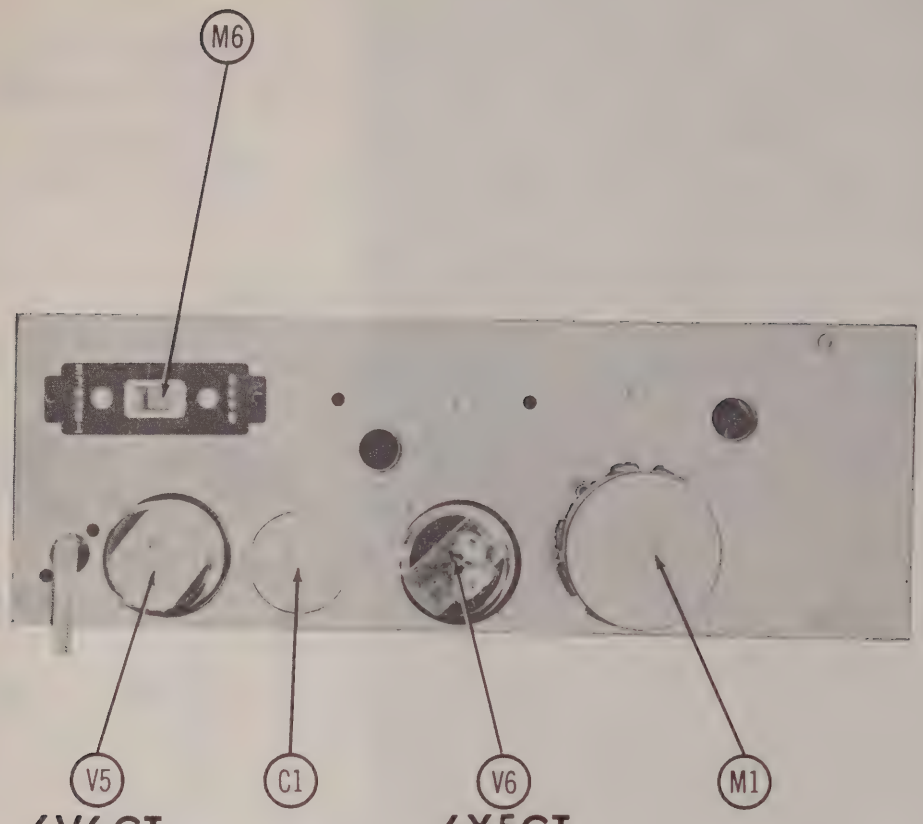
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			AIRLINE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	14A	A200	FH256	307014 (14A-SFE)	155014	SFE14	HD1

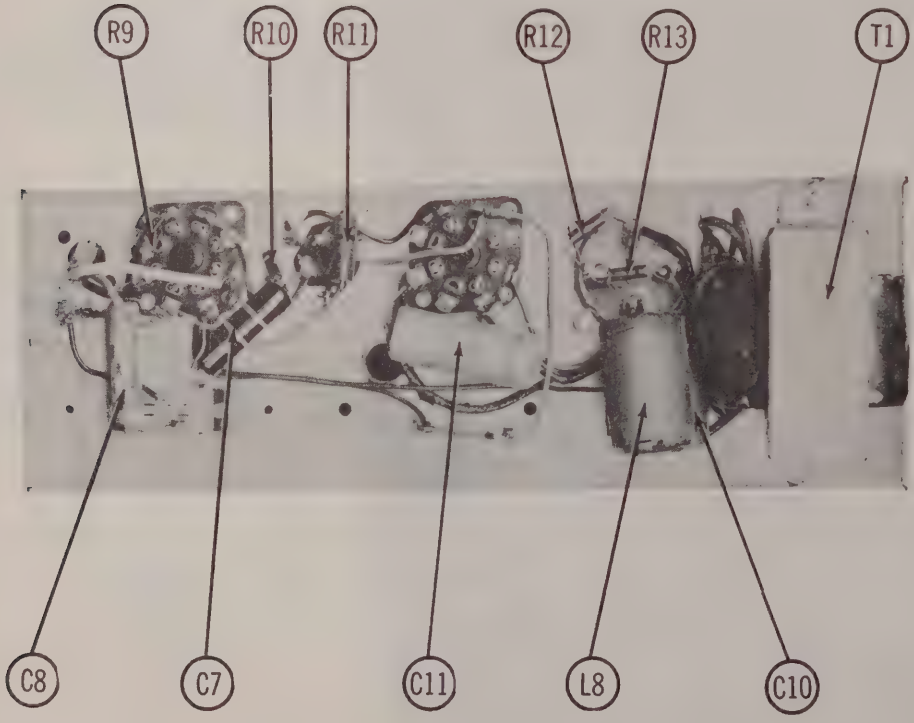
MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M3	Dial light	T47	Bayonet #47
M4	Tuning cap.	CV-100R	19-380, 19-380, 30-195MMF
M5	Spark plate		
M6	Switch		Tone
	Knob	H310E	On-off volume
	Knob	H310E	Tuning
	Dial scale	D152	
	Dial pointer	PS152	

CHASSIS—BOTTOM VIEW




M6
V5
C1
V6
M1
6V6GT
6X5GT


R9
R10
R11
R12
R13
T1
C8
C7
C11
L8
C10

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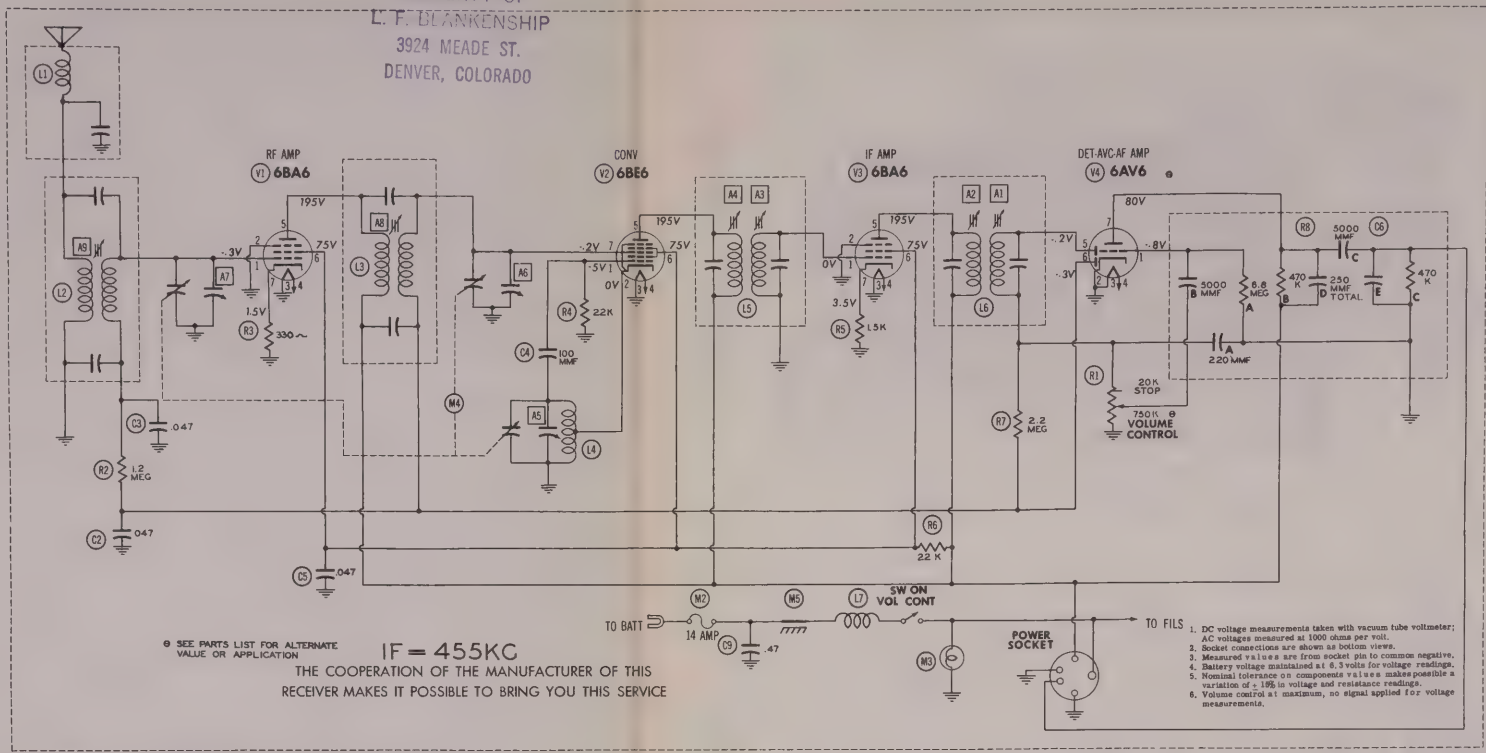


⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

IF = 455KC

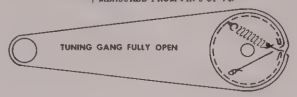
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 6.3 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

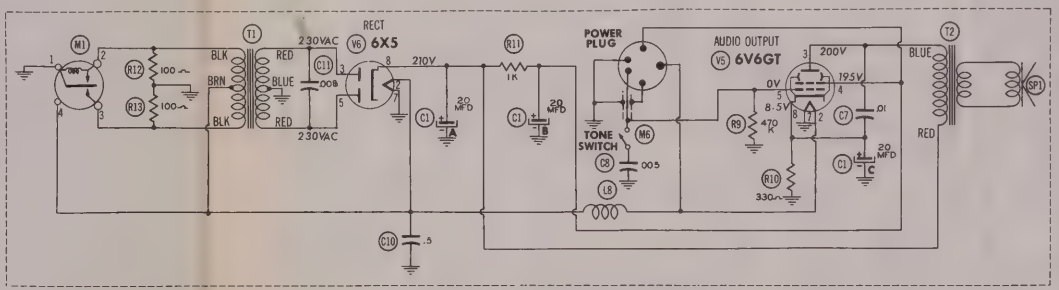
RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6BA6	4.3Meg	0Ω	0Ω	.1Ω	↑ 1KΩ	↑ 23KΩ	330Ω	
V 2	6BE6	22KΩ	1Ω	0Ω	.1Ω	↑ 1KΩ	↑ 23KΩ	3 Meg	
V 3	6BA6	18Ω	0Ω	0Ω	.1Ω	↑ 18KΩ	↑ 23KΩ	1.5KΩ	
V 4	6AV6	6.8Meg	0Ω	0Ω	.1Ω	750KΩ	3 Meg	↑ 470KΩ	
V 5	6V6GT	INF.	1Ω	↑ 395Ω	↑ 1KΩ	470KΩ	INF.	0Ω	330Ω
V 6	6X5	INF.	.1Ω	262Ω	INF.	295Ω	INF.	0Ω	50KΩ

↑ MEASURED FROM PIN 8 OF V6.



DIAL CORD STRINGING



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MODEL 13-G-150

FIRESTONE
MODEL 13-G-150

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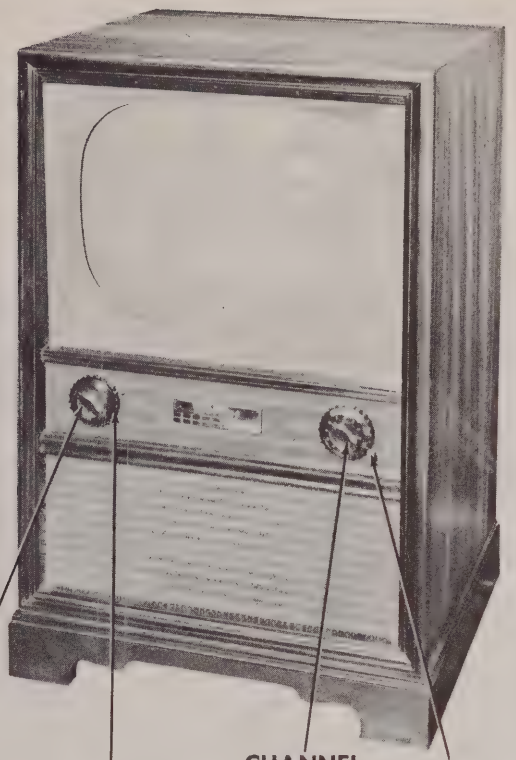

FIRESTONE
MODEL 13-G-150

TRADE NAME	Firestone Model 13-G-150
SUPPLIER	Firestone Tire & Rubber Co., 1200 Firestone Parkway, Akron, Ohio
TYPE SET	Television Receiver
TUBES	Twenty-five
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 2.16 A mp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13VHF, 14 thru 83UHF, Video IF 45. 75MC, Sound IF 41. 25MC (Intercarrier)

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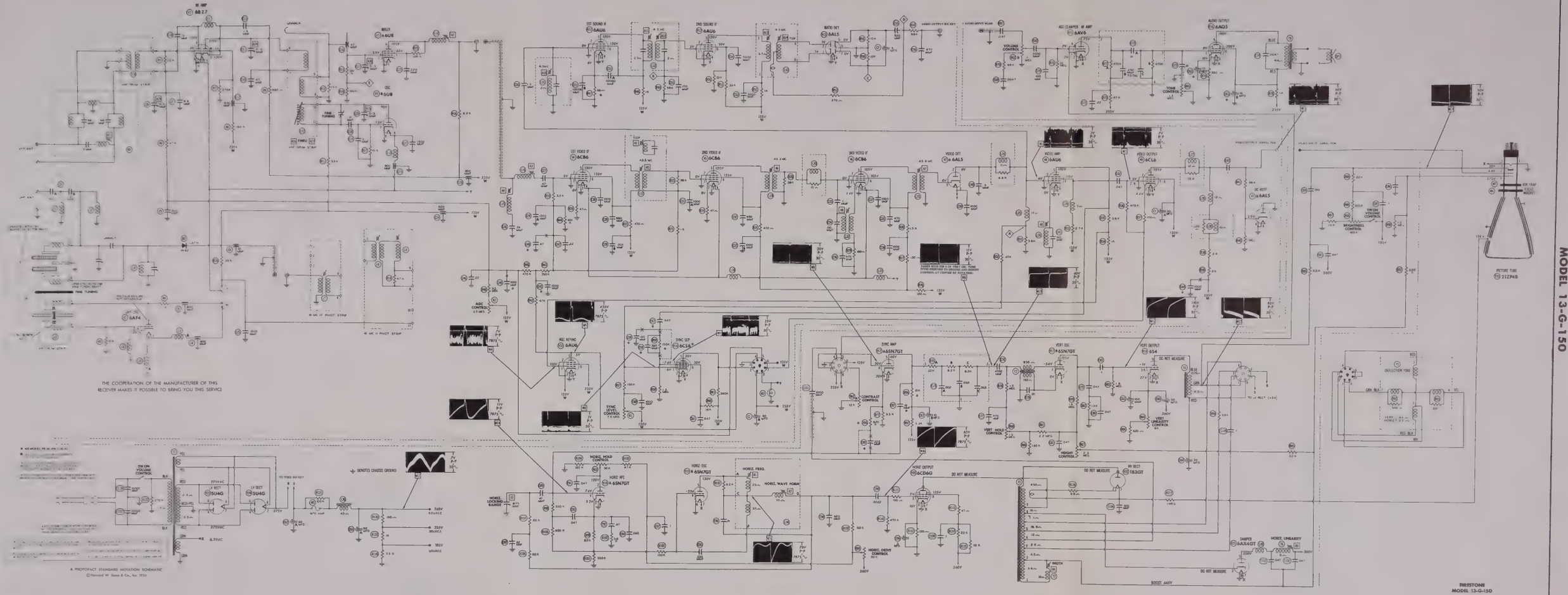
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DENOTES CHASSIS GROUND
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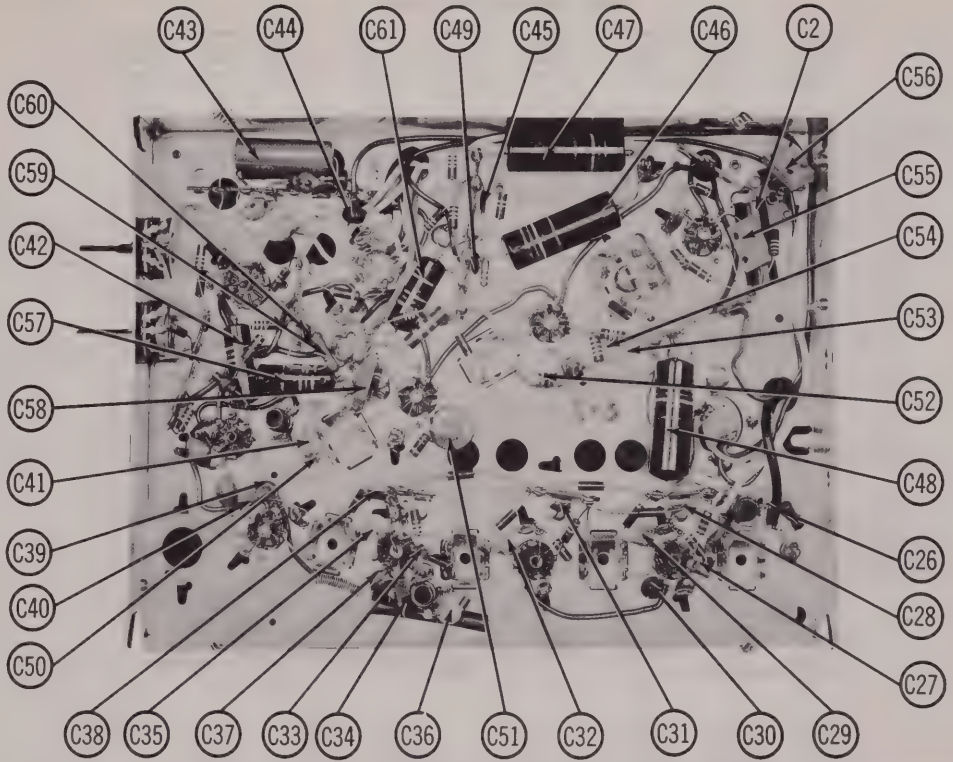
RF-IF CHASSIS-TOP VIEW



RF-IF CHASSIS-BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART

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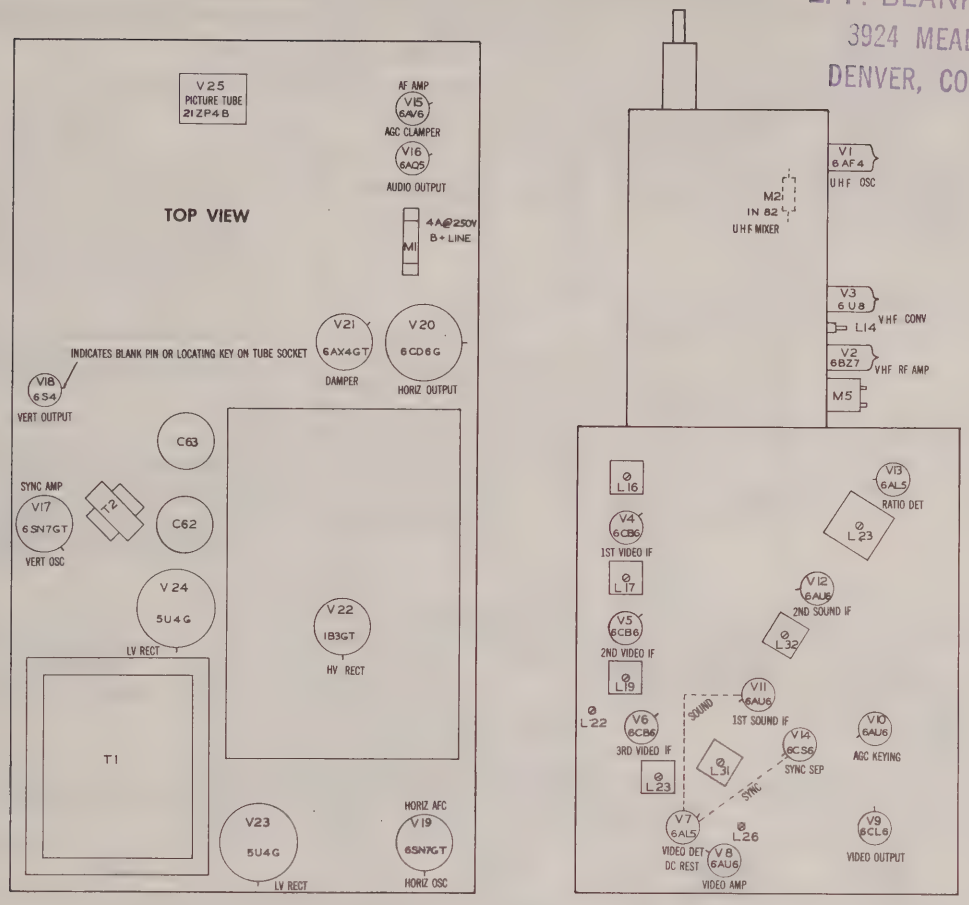

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V23, V24, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V7, (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V8, V9, V10, V25
Has pic, no sound - V11, V12, V13, V14, V15, V16
Overloaded picture - V10, V15

SYNC FAILURE
No vert. sync - V17
No horiz. sync - V17, V19
No vert. or horiz. sync - V14, V17

SWEEP FAILURE
No raster, has sound - V19, V20, V21, V22, V25
No vertical deflection - V17, V18
Poor vert. linearity or foldover - V17, V18
Poor horiz. linearity or foldover - V19, V20, V21
Narrow picture - V19, V20, V21, V22, V23, V24
Vert. off freq. - V17
Horiz. off freq. - V17, V19

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube to disable the high voltage.

VIDEO IF ALIGNMENT

Connect the negative lead of a 1.5 volt battery to the ungrounded side of C28A. Connect the positive lead to chassis.
Remove the RF amplifier tube (V2) from its socket.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube (V3). Low side to tuner chassis.	44MC (10MC Swp)	41.25MC 45.75MC 47.25MC	Any unused channel	Vert. Amp. thru detector (Fig.1) to pin 5 (plate) of 6CB6 (V4). Low side to chassis.	A1, A2, A3, A4	Adjust A1 to place 47.25MC marker in trap notch as in Fig. 2. Adjust A2, A3 and A4 for response similar to Fig. 2. A2 and A3 affects flat portion of curve. A4 positions the 41.25MC marker. Make sure 45.75MC marker is on peak as shown or the 44.5MC marker on overall response curve (Fig.3) will be incorrect.
2.	"	"	Not used	42.5MC (Unmod)	"	Use VTVM DC probe to point Ⓐ. Common to chassis.	A5	Increase bias from 1.5 volts to 4.5 volts at ungrounded side of C28A. Attenuate generator output to maintain 1 volt at VTVM. Adjust for maximum deflection.
3.	"	"	"	45.3MC	"	"	A6	"
4.	"	"	"	43.9MC	"	"	A7	"
5.	"	"	"	41.25MC	"	"	A8	Adjust for MINIMUM deflection.
6.	"	"	44MC (10MC Swp)	41.25MC 42.25MC 42.5MC 43.9MC 44.5MC 45.3MC 45.75MC 47.25MC	"	Vert. Amp. thru 10KΩ to point Ⓐ. Low side to chassis.		Check for response curve similar to Fig.3. SLIGHTLY retouch A5 thru A8 to obtain desired response. If A1 thru A4 requires retouching step 1 should be repeated.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	10KΩ	High side thru 10KΩ to pin 2 (plate) of 6AL5 (V7A). Low side to chassis.	Not used	4.5MC (400∿Mod)	Any unused channel	Vert. Amp. to pin 2 (grid) of picture tube. Low side to chassis.	A9	Adjust for MINIMUM 400∿ indication on scope.

ALTERNATE 4.5MC TRAP ALIGNMENT

Replace the RF amplifier (V2) and remove bias battery. Tune in a TV station and adjust A9 for minimum 4.5MC beat interference in picture.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Remove 6CB6 (V6) from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	10KΩ	High side thru 10KΩ to pin 2 (plate) of 6AL5 (V7A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point Ⓑ. Common to chassis.	A10, A11, A12	Adjust for maximum deflection.
9.	"	"	"	"	DC probe to point Ⓒ. Common to chassis.	A13	Use only enough generator output to provide usable indication at VTVM. Adjust for maximum deflection.
10.	"	"	"	"	DC probe to point Ⓓ. Common to chassis.	A14	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Replace V6 in its socket.

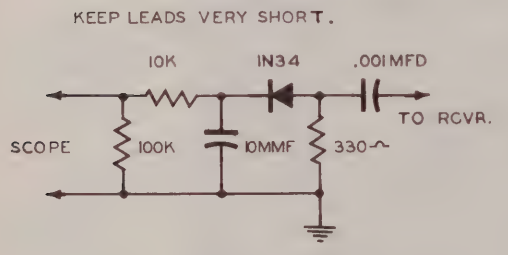

FIG. 1

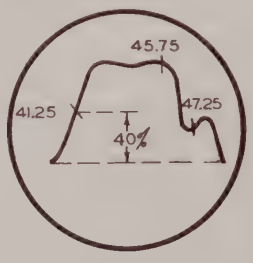

FIG. 2

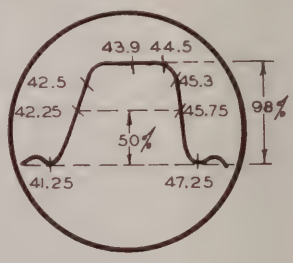

FIG. 3

FIG. 4

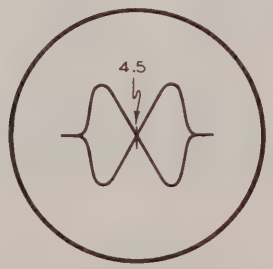

FIG. 5

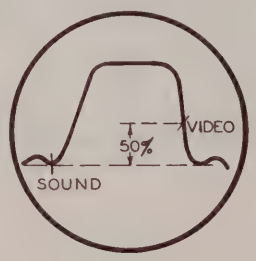

FIG. 6

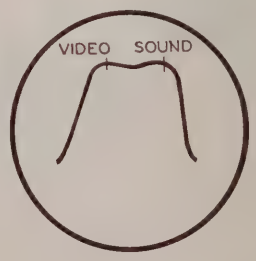

FIG. 7

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ALIGNMENT INSTRUCTIONS (cont)

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Remove 6CB6 (V6) from its socket.
Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	10KΩ	High side thru 10KΩ to pin 2 (plate) of 6AL5 (V7A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point (B). Low side to chassis.	A10,A11, A12	Adjust for curve o maximum amplitude and symmetry similar to Fig. 4.
9.	"	"	"	"	"	Vert. Amp. to point (C). Low side to chassis.	A13	Disconnect stabilizing capacitor C2. Use only enough sweep generator output to provide usable indication on scope. Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
10.	"	"	"	"	"	Vert. Amp. to point (D). Low side to chassis.	A14	Reconnect stabilizing capacitor C2. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 5. SLIGHTLY retouch A14 for maximum amplitude and straightness of crossover lines. Replace V6 in its socket.

OSCILLATOR ALIGNMENT

Connect the negative lead of a 4.5 volt bias battery to the ungrounded side of C28A. Connect the positive lead to chassis.
Complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A15. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel. If adjustment of A15 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment screw for each channel that is off frequency. The channel oscillator adjustment screws are reached through a hole just to the left of the channel switch shaft (hole extends)through UHF tuner).
The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel. Replace RF amplifier (V2) in its socket.
Remove bias battery.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A16	Adjust to place sound marker in trap notch as in Fig. 6. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A17	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A18	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A19	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A20	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A21	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A22	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A23	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A24	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A25	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A26	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A27	

RF AND MIXER ALIGNMENT

Connect the negative lead of a 3 volt bias battery to the ungrounded side of C48. Connect the positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point (E). Low side to chassis.	A28,A29 A30	Adjust for response curve similar to Fig. 7 with markers above 90%.
13.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel make compromise adjustments of A28, A29 and A30 with channel switch set to that channel. Then check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

IF WAVE TRAP ADJUSTMENT

The IF wave trap should be tuned to minimize interference caused by signals which fall within the video IF band pass (40-48MC). Tune in a station on which the interference is noted and adjust A31 for minimum interference in the picture.

UHF OSCILLATOR ADJUSTMENT

The UHF oscillator channel strip adjustments are reached through the same hole provided for VHF channel oscillator adjustment screws. Tune in all UHF stations available and check each one to see if the fine tuning control can be tuned through a point where clearest picture and best sound occur. If the fine tuning control does not have sufficient range on any UHF channel strip set the fine tuning control to its mid range position and then adjust the UHF channel strip oscillator screw for clearest picture and best sound.

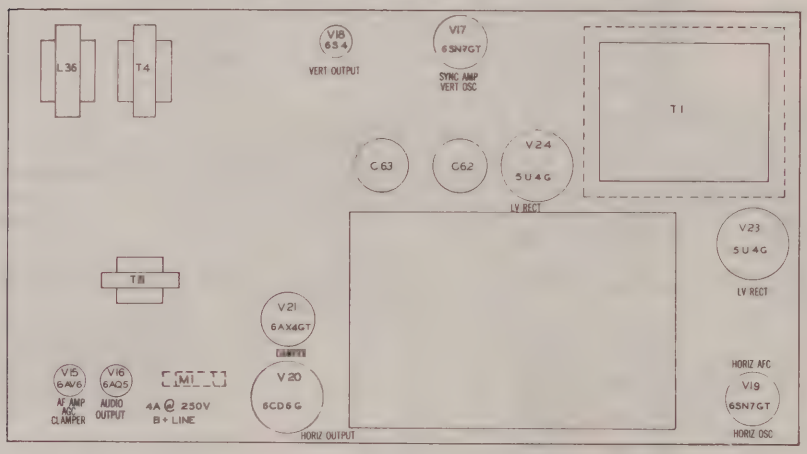
UHF RF ALIGNMENT

The UHF RF portion of this receiver has been properly aligned at the factory and is very stable.
If the RF section should ever require alignment or major repair of the UHF tuner become necessary, the entire UHF tuner should be returned to the factory service department.

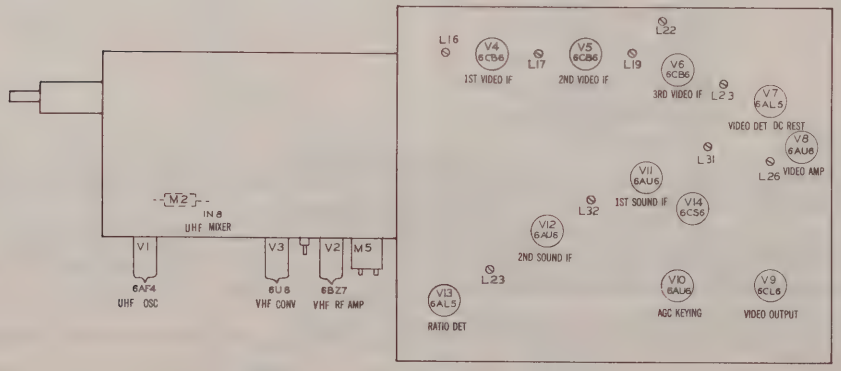
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	†▲5. 3KΩ	10KΩ	. 1Ω	0Ω	0Ω	10KΩ	†▲5. 3KΩ		
V 2	6BZ7	† 900Ω	120KΩ	INF.	0Ω	. 1Ω	INF.	950KΩ	0Ω	0Ω
V 3	6U8	† 5. 5KΩ	200KΩ	†100KΩ	. 1Ω	0Ω	† 8. 4KΩ	0Ω	0Ω	10KΩ
V 4	6CB6	100KΩ	47Ω	0Ω	. 1Ω	† 1. 7KΩ	† 1. 7KΩ	0Ω		
V 5	6CB6	100KΩ	47Ω	0Ω	. 1Ω	† 1. 8KΩ	† 1. 8KΩ	0Ω		
V 6	6CB6	. 1Ω	180Ω	0Ω	. 1Ω	† 3KΩ	† 3KΩ	0Ω		
V 7	6AL5	1 Meg	3. 9KΩ	. 1Ω	0Ω	. 5Ω	0Ω	0Ω		
V 8	6AU6	3. 9KΩ	0Ω	0Ω	. 1Ω	† 8. 8KΩ	† 3. 9KΩ	. 2Ω		
V 9	6CL6	500Ω	470KΩ	† 1. 2KΩ	. 1Ω	0Ω	† 4KΩ	0Ω	† 1. 2KΩ	470KΩ
V 10	6AU6	† 2. 2KΩ	† 1. 2KΩ	0Ω	. 1Ω	475KΩ	† 210Ω	† 1. 2KΩ		
V 11	6AU6	2Ω	0Ω	0Ω	. 1Ω	† 2. 2KΩ	† 2. 2KΩ	68Ω		
V 12	6AU6	56KΩ	0Ω	0Ω	. 1Ω	† 2. 2KΩ	† 34. 2KΩ	0Ω		
V 13	6AL5	INF.	INF.	0Ω	. 1Ω	10KΩ	0Ω	10KΩ		
V 14	6CS6	40KΩ	0Ω	0Ω	. 1Ω	† 390KΩ	† 19KΩ	1. 5Meg		
V 15	6AV6	10 Meg	0Ω	. 1Ω	0Ω	900KΩ	900KΩ	† 515KΩ		
V 16	6AQ5	470KΩ	330Ω	. 1Ω	0Ω	† 1. 6KΩ	† 1. 2KΩ	470KΩ		
V 17	6SN7GT	2. 5Meg	▲ 1. 8Meg	162Ω	† 390KΩ	† 14. 5KΩ	3. 3KΩ	. 1Ω	0Ω	
V 18	6S4	INF.	3. 5KΩ	1. 8Meg	0Ω	. 1Ω	1. 8Meg	INF.	INF.	▲ 5. 5KΩ
V 19	6SN7GT	1. 5Meg	† 80KΩ	410KΩ	480KΩ	† 120KΩ	0Ω	. 1Ω	0Ω	
V 20	6CD6G	470KΩ	0Ω	150Ω	† 10KΩ	470KΩ	INF.	. 1Ω	† 10KΩ	TOP CAP ▲ 19Ω
V 21	6AX4GT	† 50Ω	INF.	600KΩ	INF.	† 55Ω	INF.	. 1Ω	0Ω	
V 22	1B3GT				PINS 1-8 HAVE INF. RESISTANCE					TOP CAP ▲ 469Ω
V 23	5U4G	INF.	7KΩ	INF.	12Ω	INF.	14Ω	0Ω	7KΩ	
V 24	5U4G	INF.	7KΩ	INF.	12Ω	INF.	14Ω	INF.	7KΩ	
V 25	21ZP4B	. 1Ω	1. 2Meg	PIN 10 ▲200KΩ	PIN 11 † 160KΩ	PIN 12 0Ω				

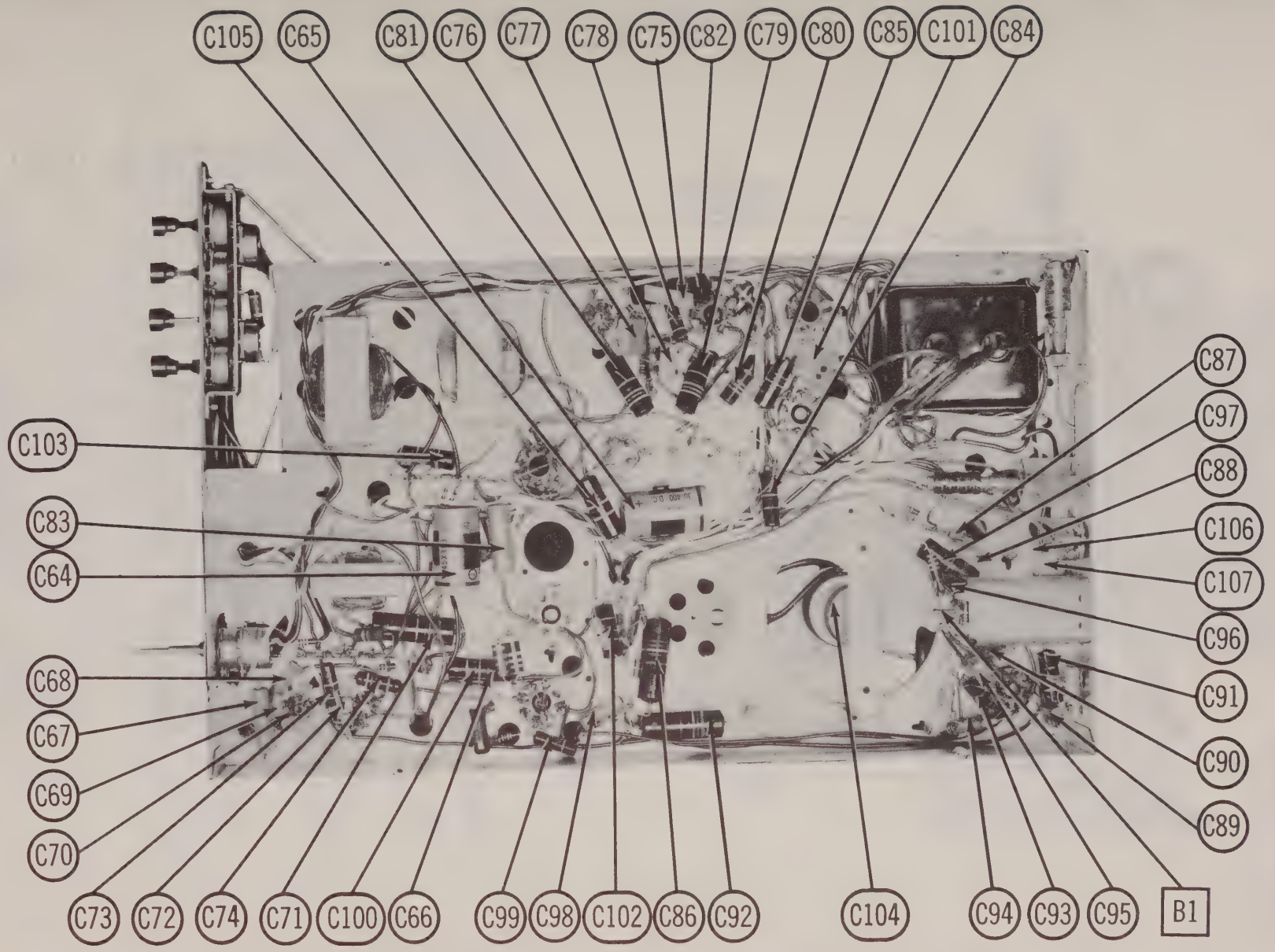
† MEASURED FROM PIN 2 OF V24.
▲ MEASURED IN UHF POSITION.
▲ MEASURED FROM PIN 3 OF V21.



BOTTOM VIEW

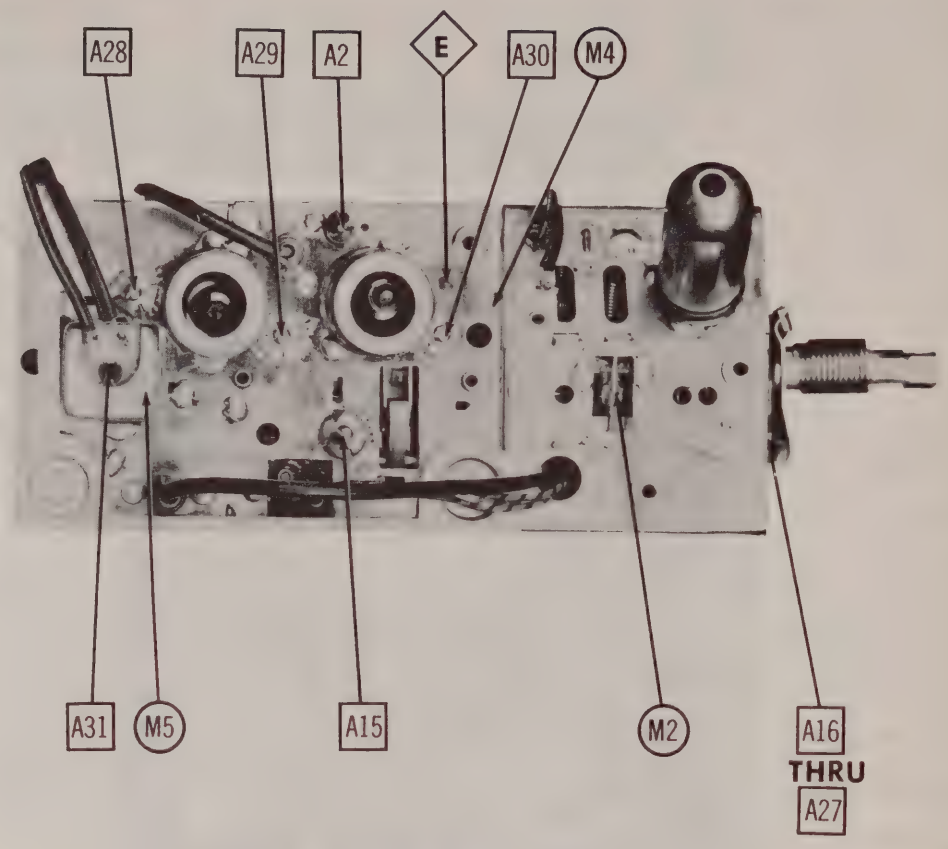


TUBE PLACEMENT CHART

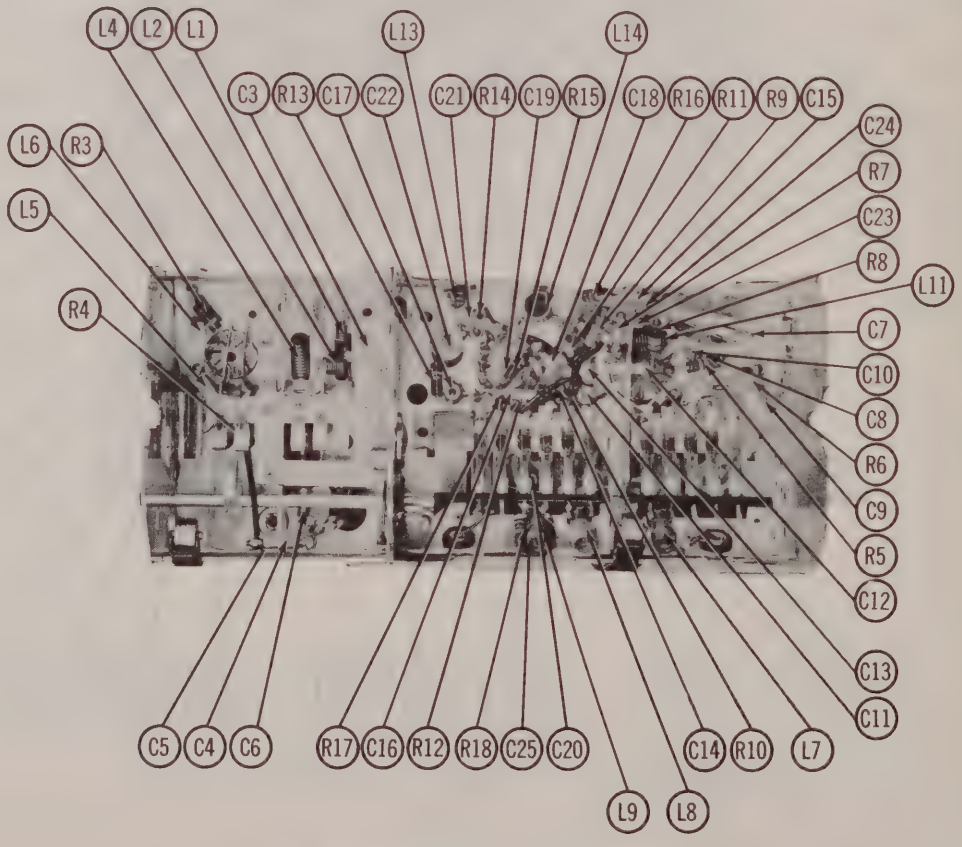


SWEEP CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



RF TUNER-TOP VIEW



RF TUNER-BOTTOM VIEW

PROPERTY OF
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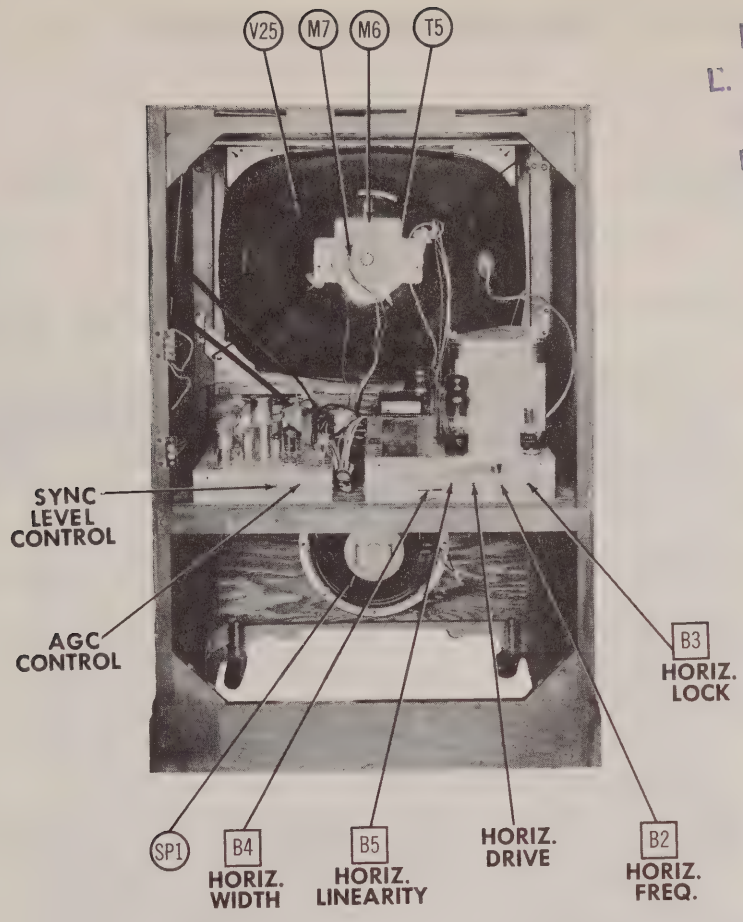
3924 MEADE ST.
DENVER, COLORADO



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

HORIZONTAL FREQUENCY ADJUSTMENT
Turn the horizontal hold control fully clockwise.
Adjust the horizontal frequency slug (B1) until the picture is just ready to lose sync. If necessary, slightly readjust the horizontal locking range trimmer (B3) to obtain this condition.

HORIZONTAL WAVEFORM ADJUSTMENT
Connect the vertical amplifier of an oscilloscope through a 10MMF capacitor to terminal "C" of L34.
Adjust the horizontal waveform slug (B2) for a waveform similar to Fig. 8. If necessary, keep picture in sync by turning horizontal hold control counter clockwise.

HORIZONTAL LOCKING RANGE ADJUSTMENT
Turn the horizontal hold control fully counter clockwise then switch off channel and back again. Slowly turn the horizontal hold control in a clockwise direction until picture just pulls into sync. If more than 3 diagonal bars were present just before picture pulled into sync adjust B3 slightly clockwise. If less than 2 bars were present adjust B3 slightly counter clockwise. Turn the horizontal hold control counter clockwise and switch off channel and back again and recheck number of bars before picture pulls into sync. Repeat procedure until 2 to 3 bars are present just before picture pulls into sync.
The horizontal holding action should now be as follows:

(a) Turn horizontal hold control fully counter clockwise. The picture should remain in sync.
(b) Switch off channel and back again. Picture may be out of sync.
(c) Turn horizontal hold control slowly clockwise and note number of bars just before picture pulls into sync. Two to three bars should be present.
(d) Turn horizontal hold control fully clockwise. Picture should be just ready to pull out of sync.

If necessary repeat "Horizontal frequency Adjustment" and "Horizontal Locking range Adjustment" until proper horizontal holding action as outlined above is obtained.
Adjust the horizontal drive control clockwise as far as possible without the presence of vertical white lines or compression near the center of the picture.
Adjust the horizontal width slug (B4) for a picture slightly wider than necessary to fill the picture mask horizontally.
Adjust the horizontal linearity slug (B5) for a picture that is symmetrical from left to right.

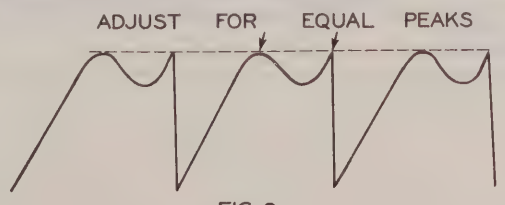


FIG. 8

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V20, and V21. Check R115, R114, R112, T3, T5A, and C66. Check adjustments R69 and B4.

DRIVE LINES

Check by substitution V20 and V21. Check C99, R114, R115, T3 and T5A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V20 and V21 and check horizontal output and damper stages for component failure or change of value. Check T3 and T5A.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V19, V20 and V21. Check C93 for open. Check L34, R102, R105, C97 and other associated components.

XMAS TREE EFFECT

Check by substitution V19, V20 and V21. Check L34, R102, R100, C96, C98 and C99 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V17 and V18. Check wave form W11.

If Satisfactory	If Unsatisfactory
Check T4, T5B, C64, C65, R84, R64 and other associated components.	Check T2, R79, R82, R67, C82, C81 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V17, V18. Check height and vertical linearity controls for proper adjustment. Check T4 and T5B.

COMPRESSED AT BOTTOM

Check by substitution V17, and V18. Check R67, R79, C81, T2 and other associated components.

COMPRESSED AT TOP

Check by substitution V17 and V18. Check R84, R64, C62, C65 and other associated components.

FOLDS

Check by substitution V17 and V18. Check C79, R82, C80, C82 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V14 and V17. Check C57, C61, R60 R61, R96, R97 and other associated components.

LOSS OF VERTICAL SYNC- HORIZONTAL SYNC SATISFACTORY

Substitute V17. Check wave form W9.

If Satisfactory	If Unsatisfactory
Check T2, C78, C76, C77, R68, R78 and other associated components.	Check vertical integrator network. Check video IF alignment for overloading.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V19. Check C88 if used in set. Check C89, R105, R63, R104, R101 and other associated components.

HORIZONTAL BENDING

Check by substitution V14, V17 and V19. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Check by substitution V8 and V9. Check C42, C43, C1A, R34, R35, L27, L28, L30 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check video IF alignment. Check adjustment A9.

POOR CONTRAST

Check by substitution T8 and T9. Check contrast control, picture tube, R37, L27, L24 and other associated components.

NEGATIVE PICTURE

Check by substitution V8 and V9. Check picture tube. Check video detector network. Check L27, C43 and other associated components.

SMEAR

Check by sbustitution V8 and V9. Check L24, L25, L27, C43. Check AGC network and other associated compontents.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V2, V4, V5, V6, V7, V8 and V9 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V11, V12, V13, V15 and V16. Check stages V15 and V16 using audio signal generator. Apply audio signal across R62B.

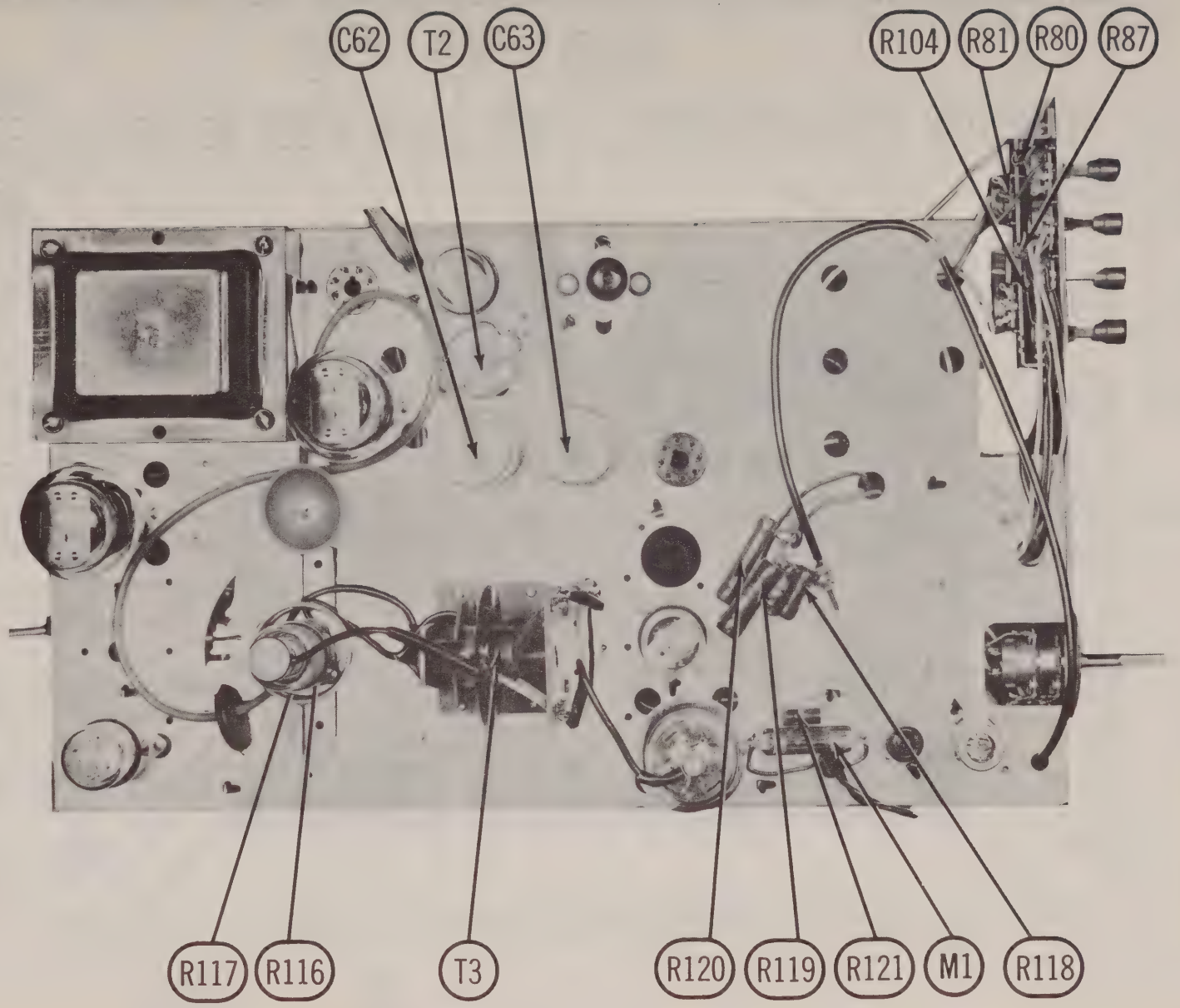
If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF for component failure or change of value.	Check C67, C69 C72, C74, R75, R72, T8, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A14 for minimum buzz. If still unsatisfactory check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

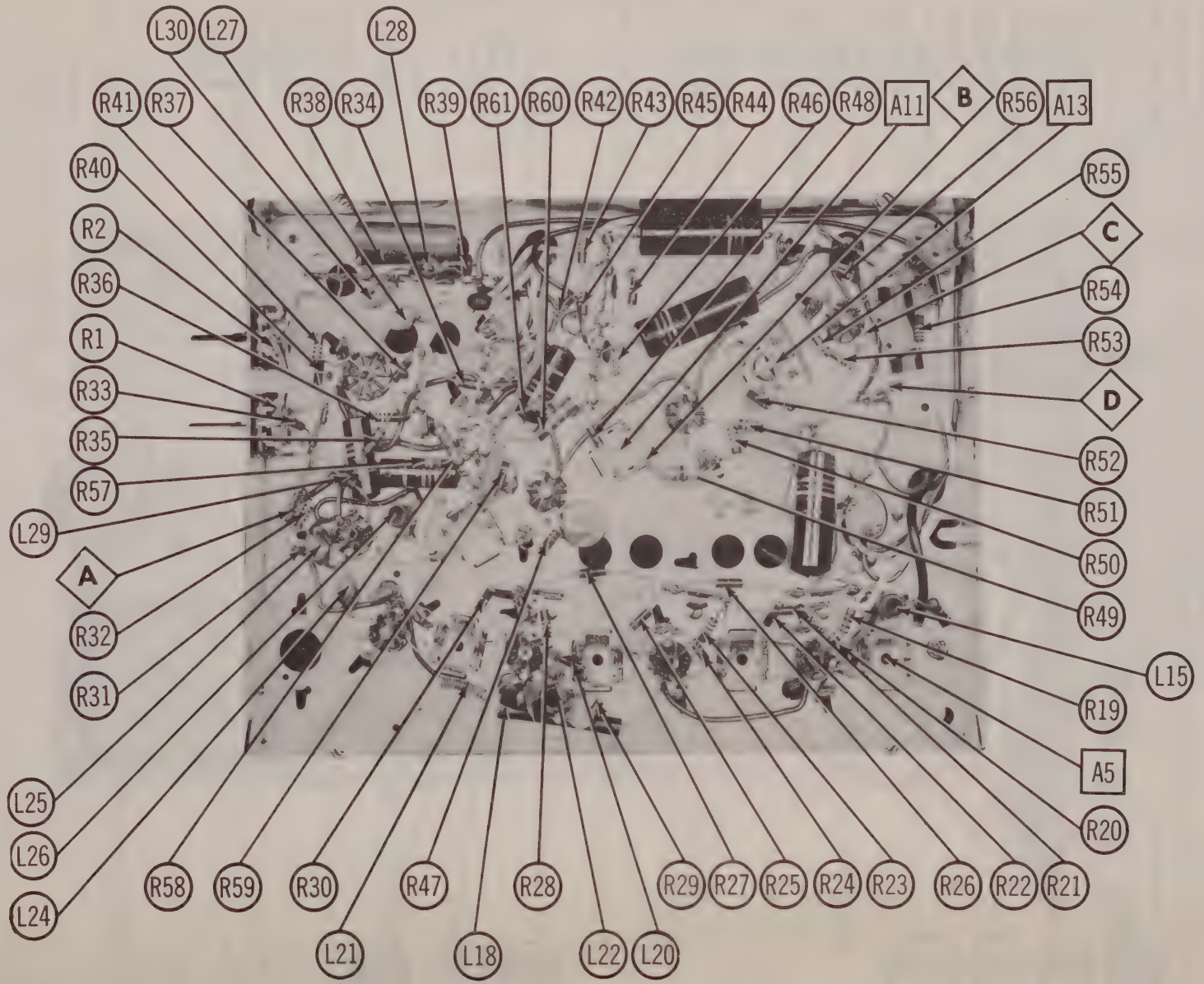


SWEEP CHASSIS-TOP VIEW

MODEL 13-G-150

FIRESTONE

PROPERTY OF
L. F. BLANKENSHIP
[illegible] MEADE ST.
DENVER, COLORADO



RF-IF CHASSIS-BOTTOM VIEW-RESISTOR INDUCTOR AND ALIGNMENT IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

RF-IF CHASSIS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: FIRESTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2	VHF RF Amp.	6BZ7	6BZ7	9AJ	
V3	VHF Converter	6U8	6U8	9AE	
V4	1st. Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Detector-DC Restorer	6AL5	6AL5	6BT	
V8	Video Amp.	6AU6	6AU6	7BK	
V9	Video Output	6CL6	6CL6	6CL6	
V10	AGC Keying	6AU6	6AU6	7BK	
V11	1st. Sound IF Amp.	6AU6	6AU6	7BK	
V12	2nd. Sound IF Amp.	6AU6	6AU6	7BK	
V13	Ratio Detector	6AL5	6AL5	6BT	
V14	Sync Separator	6CS6	6CS6	7CH	When the rear of the chassis is not marked with red paint, a 6BE6 is then used in this application.

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: FIRESTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	▲30	350	45X408	AFH3-39		C030		FP428	TVL-3782	
B	▲60	350								
C2	5	25	47X378	PRS150/4		BR550		TC30	TVA-1203	
C3A	1									
B	2									
C4	800			EF-001	MFT-1000				503C-D1	
C5	800			EF-001	MFT-1000				503C-D1	
C6	10									
C7	6.8			SI6.8NP0	TCZ-6.8	Z013	NP0K-6R8	ZT-5568	5TCCB-V68	
C8	.5-3				829-3		3115-01-0R5	CT565A		
C9	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C10	3			SI3NP0	TCZ-3	Z007	NP0K-030	ZT-5533	5TCCB-V33	
C11	.5-3				829-3		3115-01-0R5	CT565A		
C12	800			EF-001	MFT-1000				503C-D1	
C13	1.5			SI1.5NP0	TCZ-1.5	Z004	NP0K-1R5	ZT-5515	5TCCB-V15	
C14	47			BPD-000047	D6-470	G033	801-470	UC-5447	5GA-Q47	
C15	800			EF-001	MFT-1000				503C-D1	
C16	47									
C17	.5-3				829-3		3115-01-0R5	CT565A		
C18	10			SI10N750	TCN-10	N018	N750K-100	NT-541	5TCU-Q1	
C19	5									
C20	.5-3				829-3		3115-01-0R5	CT565A		
C21	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C22	220			BPD-00022	D6-221	G051	GP2K-221	UC-5322	5GA-T22	
C23	800			EF-001	MFT-1000				503C-D1	
C24	800			EF-001	MFT-1000				503C-D1	
C25	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C26	36		47X626							
C27	47		47X603	SI47	D6-470	G033	GP1K-470	UC-5447	5GA-Q47	
C28A	1000		80X3	BPD-2X001	DD2-102	DK069	812-001	DCD-521	5HK-2D1	
B	1000									
C29	680		80X5	BPD-00068	D6-681	K065	GP2K-681	UC-5368	5GA-T68	
C30	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C31A	1000		80X3	BPD-2X001	DD2-102	DK069	812-001	DCD-521	5HK-2D1	
B	1000									
C32	680		80X5	BPD-00068	D6-681	K065	GP2K-681	UC-5368	5GA-T68	
C33	1		47X588	SI1NP0	TCZ-1	TZ03	NP0K-010		5TCCB-V1	
C34	150		RCM15E151K	1469-00015		22R5T15		MCB236		
C35	470		80X4	BPD-00047	D6-471	K060	GP2K-471	UC-5347	5GA-T47	
C36	470		80X4	BPD-00047	D6-471	K060	GP2K-471	UC-5347	5GA-T47	
C37	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C38	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C39	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C40	5		47X562	SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	
C41	510	500				5R5T51				
C42	.047	400	RCP10M4473M	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C43	.1	400	RCP10M4104M	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C44	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	Note 1
C45	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	Note 2
C46	.22	200	RCP10M2224M	P488-22		CUB4P22		PT4022	4TM-P22	
C47	.22	200	RCP10M2224M	P488-22		CUB4P22		PT4022	4TM-P22	
C48	.47	200	RCP10M2474M	P288-47		CUB2P47		PT4047	2TM-P47	Note 3
C49	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	Note 1
C50	1.5		47X584	SI1.5NP0	TCZ-1.5	TZ0	NP0K-1R5	ZT-5515	5TCCB-V15	
C51A	10000		80X6	BPD-2X01	DD3-103	DK082	811-01	DC-511	5HK-2S1	
B	10000						811-01	DC-511		
C52	100		47X604	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C53	5000		47X507	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C54	5000		47X507	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C55	330	500	47X570	1469-00035		5R5T33				
C56	470	500	RCM20B471K	1469-0005		5R5T47		MCB245	MS-35	
C57	.047	400	RCP10M4473M	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	Note 4
C58	330	500	47X570	1469-00035		5R5T33				Note 1
C59	100		47X604	SI100N750	TCN-100	TN22	N750K-100	NT-531	5TCU-T1	Note 1
C60	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C61	.047	400	RCP10M4473M	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	

Note 1. Used in chassis with red paint mark on rear of chassis.
Note 2. Chassis with orange paint mark on rear use 4MFD in this application.
Note 3. Used in chassis with orange paint mark on rear of chassis.
Note 4. Chassis not marked with red paint on rear use .01MFD in this application.

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA FIRESTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	7.5Meg	½	B40X370A	Q11-142	A47-7.5Meg-S	AB-89	U-82	Sync level
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-4		Attach to R1A
R2A	2.5Meg	½	B40X369A	Q11-139	A47-2.5Meg-S	AB-83	SU565	AGC
B	Shaft		Not Req.	RQ	FKS-1/4	AK-4	Not Req.	Attach to R2A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FIRESTONE PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R3	10KΩ	½		BTS-10K	
R4	100ΩΩ	½		BTS-100Ω	
R5	22KΩ	½		BTS-22K	
R6	47KΩ	½		BTS-47K	
R7	270KΩ	½		BTS-270K	
R8	180KΩ	½		BTS-180K	
R9	68ΩΩ	½		BTS-68Ω	
R10	33KΩ	½		BTS-33K	
R11	330ΩΩ	1		BTA-330Ω	
R12	15KΩ	½		BTS-15K	
R13	100KΩ	½		BTS-100K	
R14	100KΩ	½		BTS-100K	
R15	100KΩ	½		BTS-100K	
R16	8200Ω	½		BTS-8200	
R17	10KΩ	½		BTS-10K	
R18	4700Ω	½		BTS-4700	
R19	3300Ω 5%	½	B83332	BTS-3300 5%	
R20	47Ω 5%	½	B83470	BTS-47 5%	
R21	1000Ω	½	B84102	BTS-1000	
R22	470Ω	½	B8547I	BTS-470	
R23	39KΩ 5%	½	B83393	BTS-39K 5%	
R24	47Ω 5%	½	B83470	BTS-47 5%	
R25	470Ω	½	B8547I	BTS-470	
R26	150Ω	½	B85151	BTS-150	
R27	150Ω	½	B85151	BTS-150	
R28	39KΩ 5%	½	B83393	BTS-39K 5%	
R29	180Ω	½	B84181	BTS-180	
R30	150ΩΩ	½	B84152	BTS-150Ω	
R31	3900Ω 5%	½	B83392	BTS-3900 5%	
R32	47KΩ	½	B84473	BTS-47K	

Note1.Some models may use a 100Ω resistor in this application.

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FIRESTONE PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R33	2700Ω 5%	½	B83272	BTS-2700 5%	
R34	100ΩΩ	½	B84102	BTS-1000	
R35	5600Ω	½	B84562	BTS-5600	
R36	470KΩ	½	B84474	BTS-470K	
R37	100Ω	½	B84101	BTS-100	
R38	2000Ω 5%	2	D83202		
R39	2000Ω 5%	2	D83202		
R40	1 Meg	½	B84105		
R41	68KΩ	½	B84683	BTS-68K	
R42	47KΩ	½	B84473	BTS-47K	
R43	330KΩ	½	B84334	BTS-330K	
R44	100KΩ	½	B84104	BTS-100K	
R45	470KΩ	½	B84474	BTS-470K	
R46	3.3Meg	½	B84335	BTS-3.3Meg	
R47	68Ω	½		BTS-68	Note 1
R48	1000Ω	½	B85102	BTS-1000	
R49	56KΩ	½	B84563	BTS-56K	
R50	33KΩ	½	B84333	BTS-33K	
R51	33KΩ	½	B84333	BTS-33K	
R52	1000Ω	½	B85102	BTS-1000	
R53	270Ω	½	B84271	BTS-270	
R54	68KΩ	½	B84683	BTS-68K	
R55	10KΩ 5%	½	B83103	BTS-10K	
R56	10KΩ 5%	½	B83103	BTS-10K	
R57	150KΩ	½	B84154	BTS-150K	
R58	1.5Meg	½	B84155	BTS-1.5Meg	
R59	150KΩ	½	B84154	BTS-150K	
R60	1MΩ	1	C84183	BTA-1M	
R61	390KΩ	½	B84394	BTS-390K	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA FIRESTONE PART No.	REPLACEMENT DATA MEISSNER PART No.	REPLACEMENT DATA MERIT PART No.	REPLACEMENT DATA MILLER PART No.	NOTES
L1	UHF Ant. Coil	0Ω						
L2	UHF Ant. Coil	0Ω						
L3A	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-10				Channels 10 thru 19
B	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-20				Channels 20 thru 29
C	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-30				Channels 30 thru 39
D	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-40				Channels 40 thru 49
E	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-50				Channels 50 thru 59
F	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-60				Channels 60 thru 69
G	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-70				Channels 70 thru 79
H	UHF Ant., Mixer, Osc. Coils	0Ω		9A2331-80				Channels 80 thru 82
L4	RF Choke	0Ω						
L5A	Fil. Choke	0Ω						
B	Fil. Choke	0Ω						
L6	Cathode Choke	0Ω						
L7	UHF IF Input Coil	0Ω	.3Ω					
L8	UHF IF Interstage	.3Ω	.1Ω					
L9	UHF IF Interstage	.2Ω						
L10A	VHF Ant. Coil	0Ω		9A2329-2				Channel 2
B	VHF Ant. Coil	0Ω		9A2329-3				Channel 3
C	VHF Ant. Coil			9A2329-4				Channel 4
D	VHF Ant. Coil	0Ω		9A2329-5				Channel 5
E	VHF Ant. Coil	0Ω		9A2329-6				Channel 6
F	VHF Ant. Coil	0Ω		9A2329-7				Channel 7
G	VHF Ant. Coil	0Ω		9A2329-8				Channel 8
H	VHF Ant. Coil	0Ω		9A2329-9				Channel 9
I	VHF Ant. Coil	0Ω		9A2329-10				Channel 10
J	VHF Ant. Coil	0Ω		9A2329-11				Channel 11
K	VHF Ant. Coil	0Ω		9A2329-12				Channel 12
L	VHF Ant. Coil	0Ω		9A2329-13				Channel 13
L11	Neut. Coil	0Ω						
L12A	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-2				Channel 2
B	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-3				Channel 3
C	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-4				Channel 4
D	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-5				Channel 5
E	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-6				Channel 6
F	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-7				Channel 7
G	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-8				Channel 8
H	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-9				Channel 9
I	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-10				Channel 10
J	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-11				Channel 11
K	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-12				Channel 12
L	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-13				Channel 13
L13	Fil. Choke	0Ω						
L14	Conv. Plate	.1Ω		31K264				
L15	IF trap	.1Ω		9A2330				
L16	1st. Video IF	.1Ω		9A2316				
L17	2nd. Video IF	.1Ω	.1Ω	9A2317			6218	Includes 47.25MC trap
L18	Fil. Choke	0Ω		9A2033	19-1002		4606	2.2 Microhenries
L19	3rd. Video IF	.1Ω	.1Ω	9A2316			6333 ◆	
L20	Parasitic Suppressor	0Ω		9A2322				2 turns wire on 10KΩ resistor
L21	Fil. Choke	0Ω		9A2033	19-1002		4606	2.2 Microhenries
L22	Cathode Trap	0Ω	0Ω	9A2321				
L23	4th. Video IF	.5Ω	.5Ω	9A2319			6234	
L24	Series Peaking Coil	11Ω		36A21	19-4121 ▲		6153	120 Microhenries; wound on 6.8KΩ resistor
L25	Shunt Peaking Coil	17Ω		36A22	19-3300	TV-185	6155	290 Microhenries
L26	4.5MC Trap	.3Ω		9A3074	20-1004	TV-181	1470	
L27	Series Peaking Coil	12Ω		36A17	19-3160 ■	TV-184 ■	6153 ■	147 Microhenries; wound on 15KΩ resistor
L28	Shunt Peaking Coil	12Ω		36A17	19-3160	TV-184	6153	155 Microhenries
L29	Shunt Peaking Coil	7Ω		36A10	19-4080		6172	60 Microhenries
L30	Shunt Peaking Coil	10Ω		36A19	19-3100 †		6153 †	110 Microhenries; wound on 220Ω resistor
L31	1st Sound IF	2Ω		9A2301	17-1031 ▲	TV-113 ◆	6203 ◆	
L32	2nd Sound IF	2.3Ω	2Ω	9A2323	17-1021 ▲	TV-113	6203	
L33	Ratio Det.	3.7Ω	.6ΩCT	9A2295	17-3497	TV-115	6205	

* Detune trap.
■ Parallel with 15KΩ resistor.
▲ Wound on 8.2KΩ resistor.
† Parallel with 220Ω resistor.
▲ Drill mounting holes.
◆ Use one winding.

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA FIRESTONE PART No.	REPLACEMENT DATA MEISSNER PART No.	REPLACEMENT DATA MERIT PART No.	REPLACEMENT DATA MILLER PART No.	NOTES
D	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-5				Channel 5
E	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-6				Channel 6
F	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-7				Channel 7
G	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-8				Channel 8
H	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-9				Channel 9
I	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-10				Channel 10
J	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-11				Channel 11
K	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-12				Channel 12
L	RF, Mixer Grid, Osc. Coil	0Ω		9A2330-13				Channel 13
L13	Fil. Choke	0Ω						
L14	Conv. Plate	.1Ω		31K264				
L15	IF trap	.1Ω		9A2330				
L16	1st. Video IF	.1Ω		9A2316				
L17	2nd. Video IF	.1Ω	.1Ω	9A2317			6218	Includes 47.25MC trap
L18	Fil. Choke	0Ω		9A2033	19-1002		4606	2.2 Microhenries
L19	3rd. Video IF	.1Ω	.1Ω	9A2316			6333 ◆	
L20	Parasitic Suppressor	0Ω		9A2322				2 turns wire on 10KΩ resistor
L21	Fil. Choke	0Ω		9A2033	19-1002		4606	2.2 Microhenries
L22	Cathode Trap	0Ω	0Ω	9A2321				
L23	4th. Video IF	.5Ω	.5Ω	9A2319			6234	
L24	Series Peaking Coil	11Ω		36A21	19-4121 ▲		6153	120 Microhenries; wound on 6.8KΩ resistor
L25	Shunt Peaking Coil	17Ω		36A22	19-3300	TV-185	6155	290 Microhenries
L26	4.5MC Trap	.3Ω		9A3074	20-1004	TV-181	1470	
L27	Series Peaking Coil	12Ω		36A17	19-3160 ■	TV-184 ■	6153 ■	147 Microhenries; wound on 15KΩ resistor
L28	Shunt Peaking Coil	12Ω		36A17	19-3160	TV-184	6153	155 Microhenries
L29	Shunt Peaking Coil	7Ω		36A10	19-4080		6172	60 Microhenries
L30	Shunt Peaking Coil	10Ω		36A19	19-3100 †		6153 †	110 Microhenries; wound on 220Ω resistor
L31	1st Sound IF	2Ω		9A2301	17-1031 ▲	TV-113 ◆	6203 ◆	
L32	2nd Sound IF	2.3Ω	2Ω	9A2323	17-1021 ▲	TV-113	6203	
L33	Ratio Det.	3.7Ω	.6ΩCT	9A2295	17-3497	TV-115	6205	

* Detune trap.
■ Parallel with 15KΩ resistor.
▲ Wound on 8.2KΩ resistor.
† Parallel with 220Ω resistor.
▲ Drill mounting holes.
◆ Use one winding.

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA FIRESTONE PART No.	REPLACEMENT DATA SYLVANIA PART No.	REPLACEMENT DATA FEDERAL PART No.	NOTES
M2	1N82		1N82 or 1N82A	1N72A	UHF Mixer

MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M3	Dial Light	7A32	#51, Bayonet
M4	Tuner	25A1112	VHF-UHF
M5	Trap	31K-225	IF waveform- UHF Ant. Input

SWEEP CHASSIS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA FIRESTONE PART No.	REPLACEMENT DATA STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1B	Audio Amplifier-AGC Clamper	6AV6	6AV6	7BT	
V1C	Audio Output	6AQ5	6AQ5	7BZ	
V1F	Sync Amp.-Vert. Osc.	6SN7GT	6SN7GT	8BD	
V1H	Vert. Output	6S4	6S4	9AC	
V1G	Horiz. AFC-Horiz. Osc.	6SN7GT	6SN7GT	8BD	
V2D	Horiz. Output	6CD6G	6CD6G	5BT	
V2I	Damper	6AX4GT	6AX4GT	4CG	
V2J	HV Rectifier	1B3GT	1B3GT	3C	
V2K	LV Rectifier	5U4G	5U4G	5T	
V2L	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA FIRESTONE PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V2S	21ZP4B	21ZP4B	21ZP4B	21ZP4B 21ZP4A 21ZP4 ①	21ZP4B	12N 12N 12D	① Circuit changes necessary.

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA FIRESTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C52A	▲80	350	47X409	AFB4-87		D066		FP245	TVL-4747	
B	▲10	350						TC3501		
C	▲100	50								
C53A	▲80	350	47X407	AFB4-84		D065		FP245	TVL-4745	
B	▲10	350						TC42		
C	▲10	50								
C54	30	400	45X393	PRS450/30		BR3045		TC77	TVA-1711	Note 5
C55	30	400	45X393	PRS450/30		BR3045		TC77	TVA-1711	
C56	5	25	47X378	PRS150/4		BR550		TC30	TVA-1203	
C57	.047	200	RCP10M2473M	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C58	.0047	400	RCP10M4472M	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C59	5000		47X507	BPD-005	DD-503	K080	81U-005	DC-538	5BK-D5	
C70	100		47X604	81100	D6-101		GP1K-101	UC-531	5GA-T1	
C71	.22	400	RCP10M4224M	P488-22		CUB4P22		PT4P23	4TM-P22	
C72A	.01									
B	250		↑76X5	↑PA-112-3	↑PC-80	↑13TM1	↑1404-01		↑T-1	
C										
C73	.01	400	RCP10M2103M	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C74	.0047	600	RCP10M6472M	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C75A	.002		↑76X7	↑PA-110	↑PC-100	↑11STM1	↑1405-01	PT622	↑V-1	
B	.005							PT625		
C	.005							PT635		
C76	4700	500	RCM30B472J	1464-005		IR5D47			MS-35	
C77	470	500	RCM20B471K	1469-0005		5RS747			MS-35	
C78	.01	400	RCP10M2103M	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C79	.047	600	RCP10M6473M	P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C80	.047	200	RCP10M2473M	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C81	.047	600	RCP10M6473M	P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C82	.1	600	RCP10M6104M	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C83	.047	600	RCP10M6473M	P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C84	.015	600	RCP10M6153M	P688-015		CUB6S15		PT6115	6TM-S15	
C85	.1	200	RCP10M2104M	P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C86	.1	600	RCP10M6104M	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C87	18	500	RCM20B180K	1469-00002		22R5Q18			MS-42	Note 6
C88	220	500	RCM20B221K	1469-00025		22R5T22				Note 7
C89	47	500	RCM20B470K	1469-00005		22R5Q47			MS-45	
C90	82	500	RCM20B820K			22R5Q82				
C91	.047	400	RCP10M4473M	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C92	.47	400	RCP10M2474M	P488-47		CUB4P47		PT4047	4TM-P47	
C93	.047	200	RCP10M2473M	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C94	.023	200	RCP10M2233M	P288-022	DF-203	CUB4S22	81T-02	PT4122	4TM-S22	
C95	330	500	RCM20B331K	1469-00035		5RS733				
C96	.01	400	RCP10M2103M			CUB4S1				
C97	.1	400	RCP10M4104M	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C98	820	500	RCM25B821K			5RS782				
C99	.0022	400	RCP10M4222M	P488-0022	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C100	.1	400	RCP10M4104M	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C101	1000	1000	47X569							
C102	.047	400	RCP10M4473M	P488-047		CUB4S47		PT4147	4TM-S47	
C103	.047	400	RCP10M4473M	P488-047		CUB4S47		PT4147	4TM-S47	
C104	500	30000	47X561		TVS-503	MMU30Y5				
C105	.1	400	RCP10M4104M	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C106	10000		47X615	BPD-01	DD-103	K082	81U-01	DC-541	5HK-S1	
C107	10000		47X615	BPD-01	DD-103	K083	81U-01	DC-511	5HK-S1	

Note 5. Some models use 40MFD in this application.
Note 6. Chassis not marked with orange paint on rear use 36MMF in this application.
Note 7. C88 used only in chassis marked with orange paint on rear of chassis.
† Items C72A, C72B, C73C, C72A, R72B are combined in one unit.
When replacing items separately C72B and C72C should tota: 250MMF.
◆ Items C75A, C75B, C75C, R76A, R76B, R76C are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA FIRESTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R52A	1200Ω	½	B78X18D		RTV-485	F1-7	UF152R	Contrast-Panel
B	1 Meg	½				RJ-57	UZ16-T25	Volume Rear Tapped at 200K
C	Switch					KB-3	US-27	Attach to R52B
R53A	50KΩ	½	B40X374	Q11-123	A47-50K-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R53A
R64A	500Ω	½	B40X375	Q11-116	A47-10K-S	AB-16	SU-30	Vert. Linearity
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R64A
R65A	1.5Meg	½	B40X373	Q11-138	A47-1.5Meg-S	AB-75	U-155	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R65A
R66A	100KΩ	½	B40X372A	Q11-128	A47-100K-S	AB-40	U-41	Brightness
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R66A
R67A	2.5Meg	½	B40X369A	Q11-239	A47-2.5Meg-S	BX-83	SU-565	Height
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R67A
R68A	1.5Meg	½	B40X373	Q11-136	A47-1.5Meg-S	AB-75	U-155	Vert. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R68A
R69A	50KΩ	½	B40X374	Q11-123	A47-50K-S	AB-31	U-35	Horiz. Drive
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R69A

FIRESTONE
MODEL 13-G-150

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	FIRESTONE PART No.	IRC PART No.	
R70	68KΩ	½		BTS-68K	
R71	10 Meg	½	B85106	BTS-10Meg	
R72A	470KΩ	½	† 76X5	BTS-470K	
B	470KΩ	½		BTS-470K	
R73	47KΩ	½	B85473	BTS-47K	
R74	330Ω	1	C84331	BTA-330	
R75	1000Ω	2	D84102	BTB-1000	
R76A	22KΩ	½		BTS-22K	
B	8200Ω	½	♦ 76X7	BTS-8200	
C	8200Ω	½		BTS-8200	
R77	3300Ω	½	B84332	BTS-3300	
R78	1.5Meg	½	B84155	BTS-1.5Meg	
R79	1.5Meg	½	B84155	BTS-1.5Meg	
R80	180KΩ	½	B84184	BTS-180K	
R81	2.2Meg	½	B84225	BTS-2.2Meg	
R82	15KΩ	½	B84153	BTS-15K	
R83	1.8Meg	½	B84185	BTS-1.8Meg	
R84	820Ω	2	D84821	BTB-820	
R85	3300Ω	1	C84332	BTA-3300	
R86	2200Ω	½	B84222	BTS-2200	
R87	10KΩ	½	B85103	BTS-10K	
R88	100KΩ	½	B85104	BTS-100K	
R89	22KΩ	½	B84223	BTS-22K	
R90	1.2Meg	½	B84125	BTS-1.2Meg	
R91	220KΩ	½	B84224	BTS-220K	
R92	330Ω	½		BTS-330	
R93	330Ω	½		BTS-330	
R94	5600Ω	½	B85562	BTS-5600	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	FIRESTONE PART No.	IRC PART No.	
R95	820KΩ	½	B84824	BTS-820K	Note 2
R96	10KΩ	1	C84103	BTA-10K	Note 3
R97	3300Ω	½	B84332	BTS-3300	
R98	330KΩ	½		BTS-330K	
R99	82KΩ	½	B84823	BTS-82K	
R100	150KΩ	½		BTS-150K	
R101	330KΩ	½		BTS-330K	
R102	8200Ω	½	B84822	BTS-8200	
R103	3900Ω	½	B84392	BTS-3900	
R104	120KΩ	½	B84124	BTS-120K	
R105	47KΩ	½	B85473	BTS-47K	
R106	820KΩ	½		BTS-820K	
R107	82KΩ	½	B84823	BTS-82K	
R108	82KΩ	½	B84823	BTS-82K	
R109	82KΩ	1	C84823	BTA-82K	
R110	470KΩ	½		BTS-470K	
R111	1000Ω	½	B85101	BTS-100	
R112	150Ω	5	43X280	PW7-150	
R113	47Ω	½	B85470	BTS-47	
R114	22KΩ	2	D84223	BTB-22K	
R115	18KΩ	2	D84183	BTB-18K	
R116	3.9Ω	1	43X251		
R117	1 Meg	½	C85105	BTS-1 Meg	
R118	7500Ω	5	43X284	1 3/4A-7500	
R119	1000Ω	15	43X281	2D-1000	
R120	160Ω	10	43X282		
R121	100KΩ	2	D85104	BTB-100K	
R122	270KΩ	½	B85274	BTS-270K	

† Items R72A, R72B, C72A, C72B, C72C are combined in one unit.
♦ Items R76A, R76B, R76C, C75A, C75B, C75C are combined in one unit.
Note 2. Chassis not marked with orange paint on rear use 3900Ω in this application.
Note 3. Chassis not marked with orange paint on rear use 4700Ω in this application

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	FIRESTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @ 2.16A	554VCT .300ADC	5VAC @ 6A	53X336	P-8167①②				P9739①②	
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC @ 11.3A									

① Drill new mounting hole.
② Parallel and phase 6.3V @ 4.5A and 8.5A windings for Sec. # 3.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA						
		FIRESTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T2	Vert. Osc. Trans.	54X9	A-8125	A-3003	A-97X	209T1 ①	B6702	24A87 ①
T3	Horiz. Output Trans.	53X338 ⑩	A-8232*②	HV0-9 *	D-19 *	230T1 *	FB411 *	FLY-8 *②
T4	Vert. Output Trans.	51X156	A-8141	A-3039	A-104X	226T1	Z1806	26S54
T5A	Yoke-Horiz. (13MH)	9A2327-2 ③	DY-9A④	MDF-72④	Y-17 ④	209D1 ④	DF602 ④	Y-4 ④
B	Vert. (38MH)							
T6	Horiz. Linearity (1.4-8MH)	9A2293	WC-8	MWC-6⑤	WC-12 ⑥	213R1		WC-18 ⑤
T7	Width (3.8-28MH)	9A2292	WC-5⑥⑦	MWC-1⑥⑦	WC-11⑥⑦	215R1 ⑦	RF800⑦⑧	WC-20⑦⑨

① Drill one new mounting hole.
② Drill new mounting holes.
③ Includes R92, R93 and eight prong male plug.
④ Use original yoke network.
⑤ Enlarge mounting hole.
⑥ Connect to coded blue and red terminals.
⑦ Use original slider and core or drill new mounting hole.
⑧ Connect to coded #1 and #2 terminals.
⑨ Connect to coded #3 and #4 terminals.
⑩ Early productions use part #53X337 which is now obsolete when replacing with part #53X338. Remove two 83MMF capacitors from yoke socket and connect 5600Ω resistor to center-tap of horizontal winding as shown on schematic.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Stancor Replacement Connections	Merit Replacement Connections	Triad Replacement Connections	RCA Replacement Connections	Halldorson Replacement Connections	Thordarson Replacement Connections
	9	2	9	9	9	9	2
	8	7 & 5	8	8 & 7	8	8	4
	7	7 & 5	5	5	5	5	8
	6	4	NC	NC	NC	NC	7
	4	4	4	4	4	4	7
	T	6	T	T	T	T	6
	3	6	3	3	3	3	6
	1	8	1	1	1	1	5
Connect Width Coil Across →	3 & 1	6 & 8	3 & 1	3 & 1	3 & 1	3 & 1	6 & 5
Special Notes →			⑪	⑪	⑪	⑪	

⑪ Connect a 56MMF Cap. from terminal #5 to open end of R94 (original terminal #6 connection).

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PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	FIRESTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T8	5.2KΩ	3.4Ω	51X65A	A-3849	A-3019	S-5Z	Z1006	26S49	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	FIRESTONE PART No.	VIKING PART No.	QUAM PART No.	
SP1	10"	PM	3.4Ω	P-12A519	10J11	10A31	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	FIRESTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L34 L35	Horiz. Osc. RF Choke	80Ω .8Ω		9A2294 35A11	20-1401 19-1000	TV-161	6182 4602	Waveform winding 55Ω 1 Microhenry; IRC Part No. CLA

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	FIRESTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L36	.300ADC	43Ω	1.76HY	52X94	C-2326	C-2996	C-17X	C5037	26C44 ①

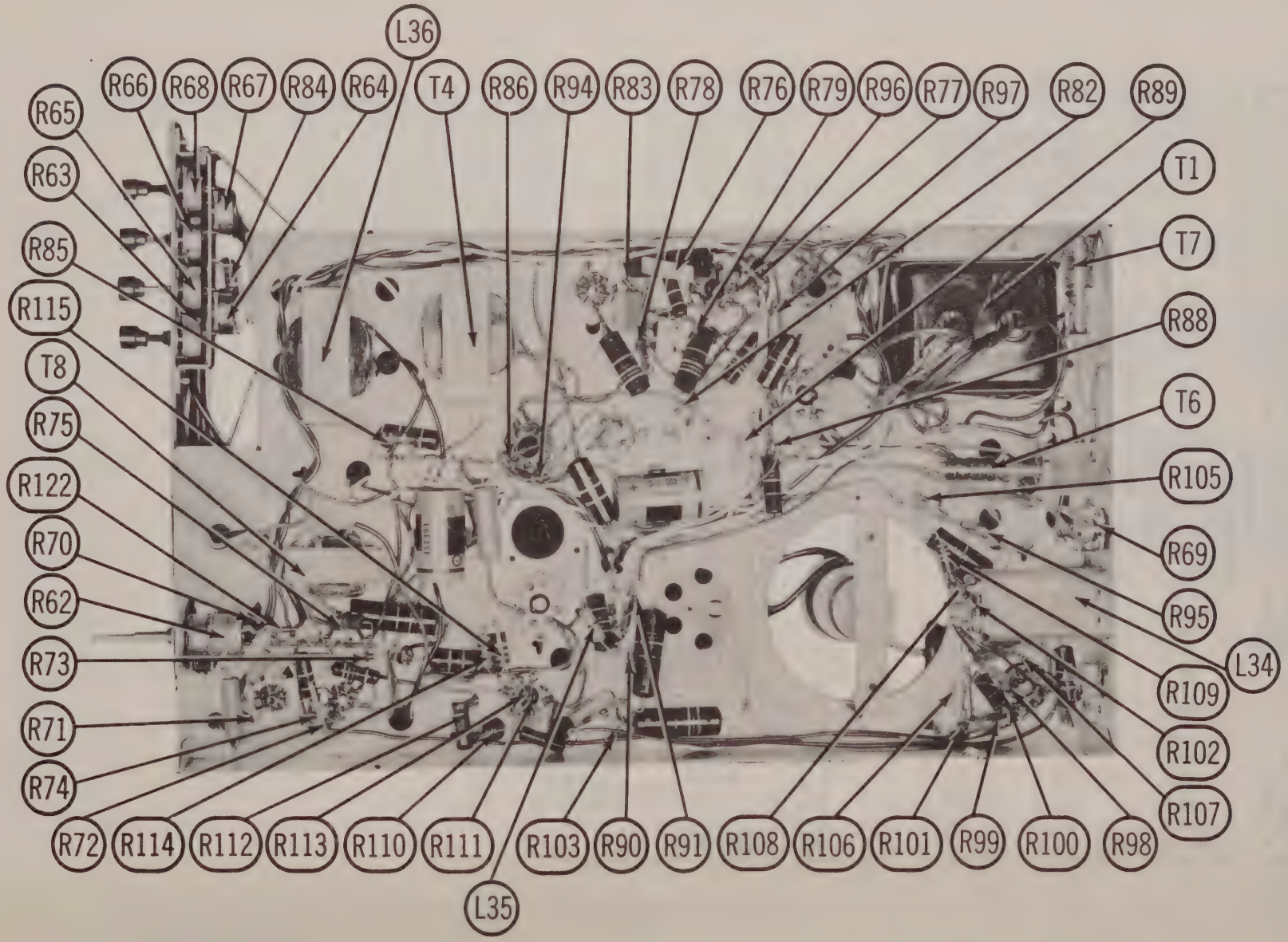
① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			FIRESTONE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG Slo-Blo	4/10 A 125V	16X147-3	16X146	313.400 (4/10A-3AG Slo-Blo)	357001	MDL 4/10	4405

MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M6	Focus Magnet	2A438	Includes centering device
M7	Ion Trap	2A407	
B3	Trimmer	17A268	6-75MMF (Horiz. Locking Range)
	Knob	10A826	Red- Secondary Controls (4 used)
	Knob	10A827-2	Red - Fine tuning
	Knob	10A831-1	Contrast
	Knob	10A830-1	On/off/volume
	Knob	10A828-1	Channel Selector - VHF
	Knob	10A839-1	Channel Selector - UHF
	Safety Glass	17X180	
	Mask	4X1230-1	



SWEEP CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

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TROUBLE SHOOTING AIDS (cont)

POWER

DEAD SET

If filaments fail to light check AC interlock assembly. Check switch on volume control and T1. If filaments light check by substitution V23 and V24. Check M1 fuse. Check B+ filter and decoupling network for component failure or change of value.

SMALL AND/OR DIM PICTURE

Check by substitution V23 and V24. Check B+ filter and decoupling network.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V19, V20, V21 and V22. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check T3, T5A, T6, T7, R114, R115, C100, C103, C102 and other associated components.	Check L34, R105, R63, R104, R109, C98, C96, C93 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V20, V21, V22, V23 and V24. Check C99, C66, R114, R115, R109 and other associated components.

BLOOMING

Check by substitution V20, V21, V22, V23 and V24. Check C99, R117, R112, C66 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V2, V3, V4, V5, V6, V7, V8 and V9. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF tuner oscillator circuit may be accomplished as follows:

1. Set the selector knob to VHF position.
2. Tune in a TV station and set the fine tuning control to the center of its range.
3. Remove the channel selector and fine tuning knobs.
4. Adjustments are accessible one at a time thru the small hole above and slightly to the left of the channel switch shaft.

To adjust the UHF oscillator, set the channel selector knobs to the desired UHF channel. The fine tuning knob should be at the center of its range. Remove knobs and adjust the oscillator slug, thru the same hole as for VHF adjustments.

If two UHF channels are received and use the same UHF coil strips, the oscillator should be set for the channel closest to the center of the group.

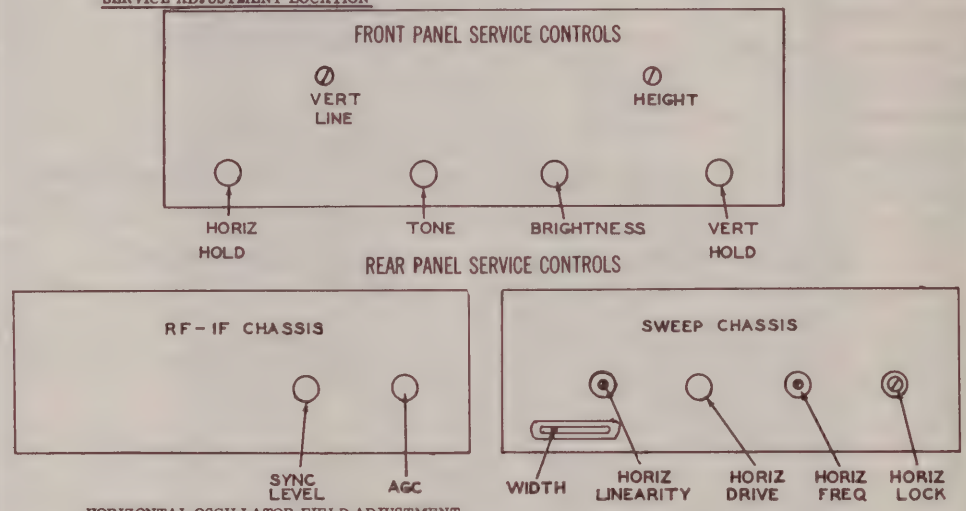
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 5 wood screws holding metal strip at top of safety glass. Remove metal strip and safety glass. (Use extreme caution when removing safety glass).

PICTURE TUBE REMOVAI

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the Horiz. Oscillator Circuit can be made from the rear panel of the chassis. Set the Horiz. Hold Control at the Mid-position of its range and adjust the Horiz. Frequency slug (L34) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L33) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for L.V. power protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 5 push-on type control from front panel.
2. Remove 2 wood screws and 2 metal screws. Remove rear cover.
3. Loosen 2 wood screws from each of the 2 antenna brackets. Remove brackets.
4. Disconnect speaker leads.
5. Remove 4 speaker nuts. Remove speaker.
6. Disconnect grounding leads (2) from yoke and between chassis.
7. Disconnect deflection yoke from chassis, hi-voltage lead, picture tube socket.
8. Disconnect chassis interconnecting cable.
9. Disconnect shielded audio lead from RF chassis, dial light leads (2), and lead from picture tube socket to RF chassis.
10. Remove 5 chassis bolts from RF chassis. Remove RF chassis.
11. Remove 5 chassis bolts from deflection chassis. Remove deflection chassis.

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PHOTOFACT* Folder

*TRADE MARK

MOTOROLA MODELS BK3A6, CT2A6, GMT3A6, HJ3A6, HN2A6, HN3A6, HT3A6, KR3A6, OE2A6, PC2A6, PD3A6, SR2A6, SR3A6 (Ch. R-15A6, P6-2, P8-2)

PROPERTY OF
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DENVER, COLORADO

MOTOROLA MODELS BK3A6, CT2A6, GMT3A6, HJ3A6, HN2A6, HN3A6, HT3A6, KR3A6, OE2A6, PC2A6, PD3A6, SR2A6, SR3A6 (Ch. R-15A6, P6-2, P8-2)

MOTOROLA MODELS BK3A6, CT2A6, GMT3A6, HJ3A6, HN2A6, HN3A6, HT3A6, KR3A6, OE2A6, PC2A6, PD3A6, SR2A6, SR3A6 (Ch. R-15A6, P6-2, P8-2)

MOTOROLA MODEL CT2A6

TRADE NAME	Motorola, Tuner Unit Ch. R15A6 and Power Ch. P6-2 (Single Ended) or P8-2 (Push-Pull Output)		
	MODEL	AUTOMOBILE	YEAR
	BK3A6	Buick Special	1949 thru 1953
		Buick Super & Roadmaster	1942 & 1946 thru 1952
	CT2A6	Chevrolet	1951 & 1952
	GMT3A6	GM & Chevrolet Trucks	1948 thru 1953
	HJ3A6	Henry J	1951 thru 1953
	HN2A6	Hudson	1951 & 1952
	HN3A6	Hudson (except Hudson Jet)	1951 thru 1953
	HT3A6	Hudson Jet	1953
	KR3A6	Kaiser	1951 thru 1953
	0E2A6	Oldsmobile "88" Super & "98" Series	1951 & 1952
	PC2A6	Pontiac	1949 thru 1952
	PD3A6	Packard	1951 thru 1953
	SR2A6	Studebaker	1950 thru 1952
	SR3A6	Studebaker	1953
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago 51, Ill.		
TYPE SET	Battery Operated Custom Built AM Automobile Superheterodyne Receiver		
TUBES	R15A6 (Tuner) Four - Types 6BD6 RF Amp., 6BE6 Conv., 6BD6 IF Amp., 6AT6 Det.-AVC-AF Amp.		
	P6-2 (Audio & Power) Two - Types 6AQ5 Audio Output, 6X4 Rectifier		
	P8-2 (Audio & Power - Push-Pull) Four - 6AT6 Phase Inverter, (2) 6AQ5 Audio Output, 6X4 Rectifier		
POWER SUPPLY	6 Volt Storage Battery		
RATINGS	6.8 Amp. @ 6.3 Volts DC (Power Unit P6-2)		
	8.5 Amp. @ 6.3 Volts DC (Power Unit P8-2)		
TUNING RANGE	535-1605KC		

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TUNER PARTS LIST AND DESCRIPTIONSed)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BD6	6BD6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amplifier	6BD6	6BD6	7BK	
V4	Det-AVC-AF Amp.	6AT6	6AT6	7BT	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1	90		21A591682							
C2	.006	100	8A4529	P688-006	D6-602	CUB6D6	GP2-333-602	PT626	6TM-D6	
C3	470	500	21R6673	1468-0005		5W5T47		MCB245	MS-35	
C4	5		21K70720	SI5	TCZ-4.7	TZ07	NPOK-050	ZT-5547	5TCUB-V5	
C5	47		21R6513	SI47	D6-470	TP29				
C6	220						N220M-221			
C7	.05	400	8R14791	P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C8	.05	100	8R13514	P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C9	27		21R410089	SI27NPO	TCZ-27	TZ16	NPOL-270			
C10	.01	400	8R23053	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C11	.006	400	8R4736	P488-006	D6-602	CUB4D6		PT426	4TM-D6	
C12	.02	400	8R12699	P488-02		CUB4S2		PT412	4TM-S2	
C13	.5	100	8K17028	VHC-36		PJ2P5		RF-480	HC-3	

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	100KΩ	½	18B512084	*QJ-399A			UF15L	Tone-Panel-Note #1 & #4
B	250KΩ	½					UR254-T753	Volume tapped @ 75KΩ-Rear
C	Switch						US-26	Attach to R1B
R1A	100KΩ	½	18K512739	**QJ-407A			UF15L	Tone-Panel -Note 2
B	250KΩ	½					UR254-T753	Volume tapped @ 75KΩ-Rear
C	Switch						US-26	Attach to R1B
R1A	100KΩ	½	18K512740	♦QJ-406A			UF15L	Tone-Panel-Note #3
B	250KΩ	½					UR254-T753	Volume tapped @ 75KΩ-Rear
C	Switch						US-26	Attach to R1B

* CONCENTRIKIT EQUIVALENT KIT K-2 BASE ELEMENTS & SHAFTS B11-128 & P1-206 (Panel) B18-130X & R1-220 (Rear) & SWITCH 76-1.

** CONCENTRIKIT EQUIVALENT KIT K-2 BASE ELEMENTS & SHAFTS B11-128 & P1-112 (Panel) B18-130X & R1-126 (Rear) & SWITCH 76-1.

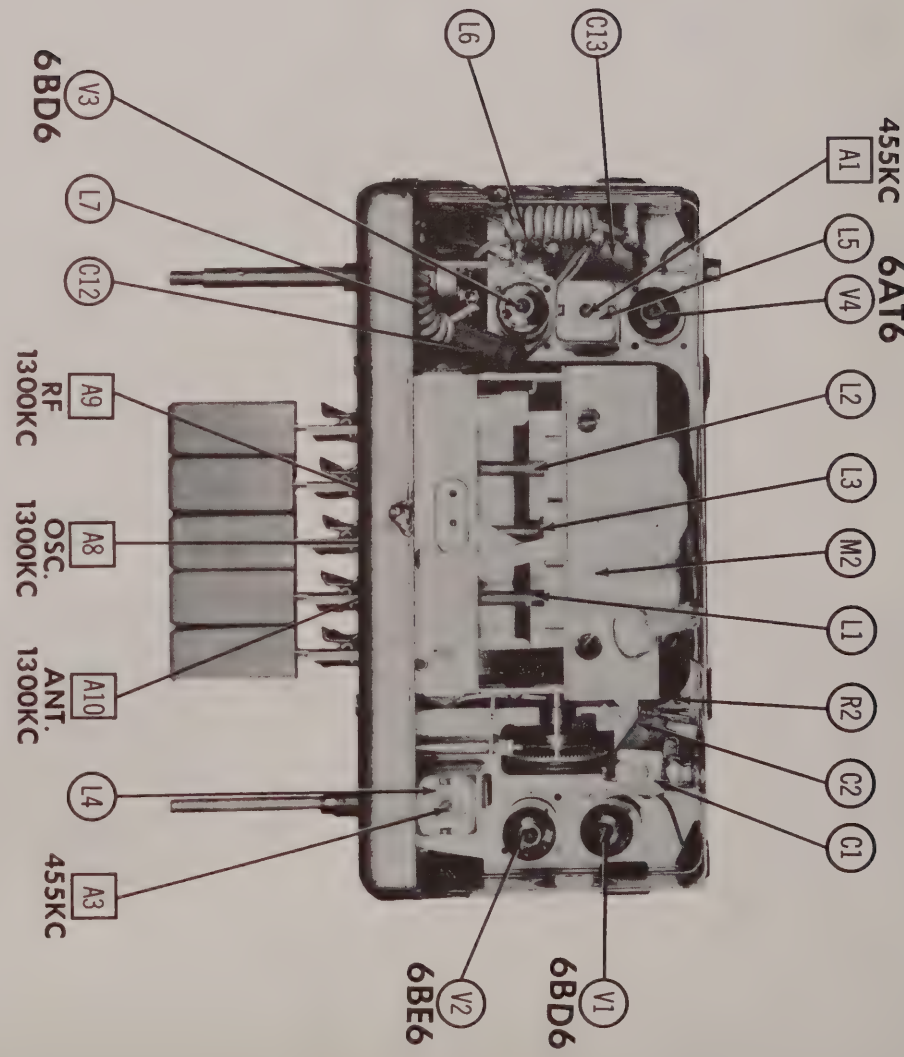
♦ CONCENTRIKIT EQUIVALENT KIT K-2 BASE ELEMENTS & SHAFTS B11-128 & P1-200 (Panel) B18-130X & R1-216 (Rear) & SWITCH 76-1.

Note 1. Used in models BK3A6, CT2A6, GMT3A6, KR3A6, OE2A6, PD3A6, SR3A6.
Note 2. Used in models HN2A6, HN3A6.
Note 3. Used in models HJ3A6, PC2A6, SR2A6.
Note 4. Model HT3A6 will use an alternate control part No. 18K530659.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	NOTES
R2	470KΩ	½	6R6032	BTS-470K	
R3	680Ω	½	6R6040	BTS-680	
R4	18KΩ	½	6R5591	BTS-18K	
R5	33KΩ	½	6R6012	BTS-33K	
R6	560Ω	½	6R6291	BTS-560	
R7	6800Ω	2	6R5690	BTB-6800	
R8	1 Meg	½	6R6004	BTS-1 Meg	
R9	1 Meg	½	6R6004	BTS-1 Meg	
R10	47KΩ	½	6R6056	BTS-47K	
R11	15KΩ	½	6R2119	BTS-15K	
R12	2.2Meg	½	6R3927	BTS-2.2Meg	
R13	100KΩ	½	6R6075	BTS-100K	

CHASSIS—TOP VIEW



TUNER CHASSIS-R15A6

TUNER PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	
SP1	6 x 9"	PM	3.4Ω	50C513200 ①	69J9	69A2	① Used in Models BK3A6, CT2A6, GMT3A6, HJ3A6, OE2A6, PC2A6, PD3A6, SR2A6, SR3A6
				50K513201③	69J9	69A2	
				50C513197 ①④	69J9	69A2	
				50C513193 ①④	69J9	69A2	② Used in Model HN2A6
				50C513544①②	69J9	69A2	③ Used in Model HN3A6
				50C513195 ①②	69J9	69A2	④ Used in Model KR3A6
				50K513194 ②③	69J9	69A2	⑤ Used in Model HT3A6
				50K513545 ②③	69J9	69A2	
				50K513196 ② ③	69J9	69A2	
				50K513198 ②③	69J9	69A2	
	5 x 7"	PM	3.4Ω	50C530769 ⑤	57J9	57A1	
				50C530738 ⑤	57J9	57A1	

ONLY ONE SPEAKER IS USED IN EACH MODEL. HOWEVER, THERE ARE MANY ALTERNATE SPEAKERS WHICH MAY BE SUPPLIED IN THE ORIGINAL EQUIPMENT. THE "NOTES" COLUMN ABOVE INDICATE THE ALTERNATES AND THE MODELS IN WHICH THEY MAY HAVE BEEN USED.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	11Ω		24B520694				Part of tuner; tuning core part # 46K489214
L2	RF Coil	11Ω		24K520695				Part of tuner; tuning core part # 46K489214
L3	Osc. Coil	.8Ω	4.2Ω	24B520693				Part of tuner; tuning core part # 46K489214
L4	Input IF	17Ω	17Ω	24C485553	16-6758	BC-352	12-C1	
L5	Output IF	17Ω	17Ω	24K485555	16-6770	BC-355	12-C6	
L6	Fil. Choke	0Ω		24K592269				
L7	Fil. Choke	0Ω		24K521084				

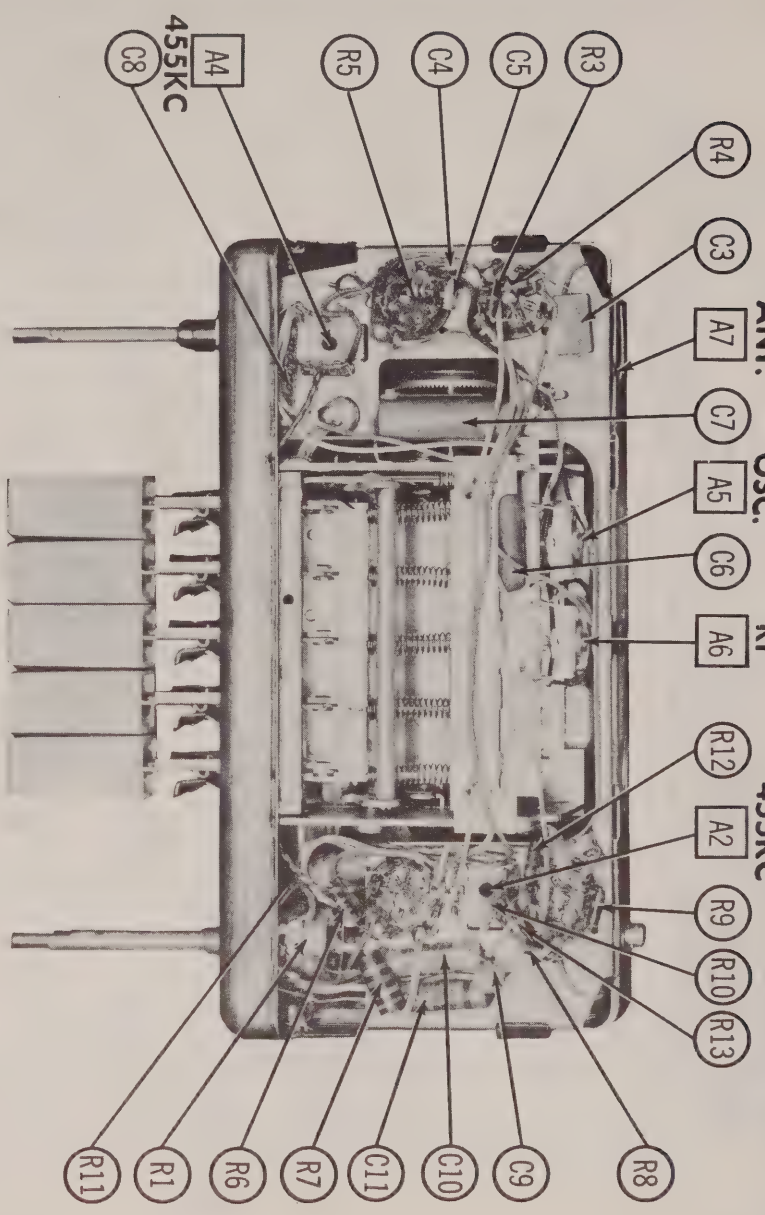
MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M1	Dial light	65X10867	Bayonet## 44
M2	Tuning unit	51D512128	Model AT-94 chassis R15A6 (all models)
		77K521943	Model MT-114
		77K521944	
		77K521945	
M3	Spark plate	1B512202	Includes receptables, chassis R15A6 (all models)
A7	Trimmer capacitor	20A513232	Ant. (20-180MMF) chassis R15A6
		20A77537	RF. (5-80MMF) chassis R15A6
		20A77537	Osc. (5- 80MMF) chassis R15A6
	Knob	36K512160	Tone-Models CT2A6, BK3A6, GMT3A6 (chassis R15A6) &
	Knob	36B513220	Tone-Models HN2A6, HN3A6, HT3A6, KR3A6, SR3A6 ((chassis R15A6) &
	Knob	36K512160	Tone-Models HJ3A6, OE2A6, SR2A6, (chassis R15A6)
	Knob	36K513169	Tone-Models PC2A6, PD3A6, chassis R15A6
	Knob	36K473550	Dummy-tuning Models BK3A6, CT2A6, GMT3A6, HJ3A6, OE2A6, SR2A6 (chassis R15A6) & mo
	Knob	36K513223	Dummy-tuning Models HN2A6, HN3A6, HT3A6, KR3A6, SR3A6 (chassis R15A6)
	Knob	36B472865	Dummy-tuning - Models PC2A6, PD3A6
	Knob	1V520078	Volume & tuning-Models BK3A6, HJ3A6, PC2A6, (chassis R15A6)
	Knob	1V513351	Volume & tuning-Models CT2A6, chassis R15A6
	Knob	1V513438	Volume & tuning-Models GMT3A6, chassis R15A6
	Kn ob	36B513035	Volume & tuning-Models HN2A6, HN3A6, HT3A6, SR2A6 (chassis R15A6)
	Knob	1V520575	Volume & tuning-Model KR3A6, chassis R15A6
	Knob	11512214	Volume & tuning-Model OE2A6, chassis R15A6
	Knob	1V513035	Volume & tuning-Models PD3A6, SR3A6, (chassis R15A6)
	Push button	1V520529	5 used; chassis R15A6, Model BK3A6
	Push button	1V510098	5 used; chassis R15A6, Model CT2A6
	Push button	1V513437	5 used; chassis R15A6, Model GMT3A6
	Push button	1V512213	5 used; chassis R15A6, Model HN2A6, HN3A6, OE2A6
	Push button	1V513034	5 used; chassis R15A6, Models HJ3A6, HT3A6, SR2A6 HT3A6, SR2A6

(CONT'D ON NEXT PAGE)

MOTOROLA CH. R15A6

CHASSIS—BOTTOM VIEW



TUNER CHASSIS-R15A6

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

When adjusting tuner cores use special alignment tool (Motorola #66A76278 or equivalent).
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	455KC (400~Mod)	High frequency end stop	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. Attenuate generator output to maintain 1.79 volts on output meter (1 watt).
2.	Fig. 1	Thru dummy to antenna receptacle	1610KC	"	"	A5, A6, A7	Back tuner cores out to project 1-5/16" from ends of coil forms. (Remove escutcheon and dial scale bracket to gain access to cores). Adjust A5, A6 and A7 for maximum output.
3.	"	"	1300KC	With tuning knob move carriage in 5/16" from position in step 2.	"	A8, A9, A10	Adjust in order given for maximum output.
4.	"	"	1610KC	High frequency end stop	"	A5, A6, A7	Adjust in order given for maximum output. Seal tuner core adjustments.
5.	Tune receiver to 1300KC signal and if necessary bend pointer to the 1300KC calibration mark on dial.						
6.	With receiver installed in car and antenna fully extended tune in a weak station near 1400KC and adjust A7 for maximum volume.						

PUSH BUTTON ADJUSTMENT

Tune manually to the desired station.
Pull out the selected push button and then press push button all the way in.
Repeat procedure for remaining push buttons.

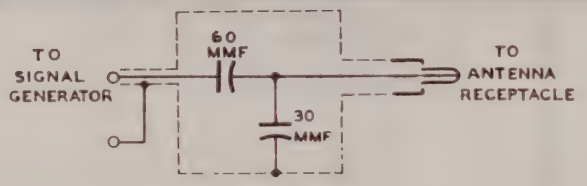
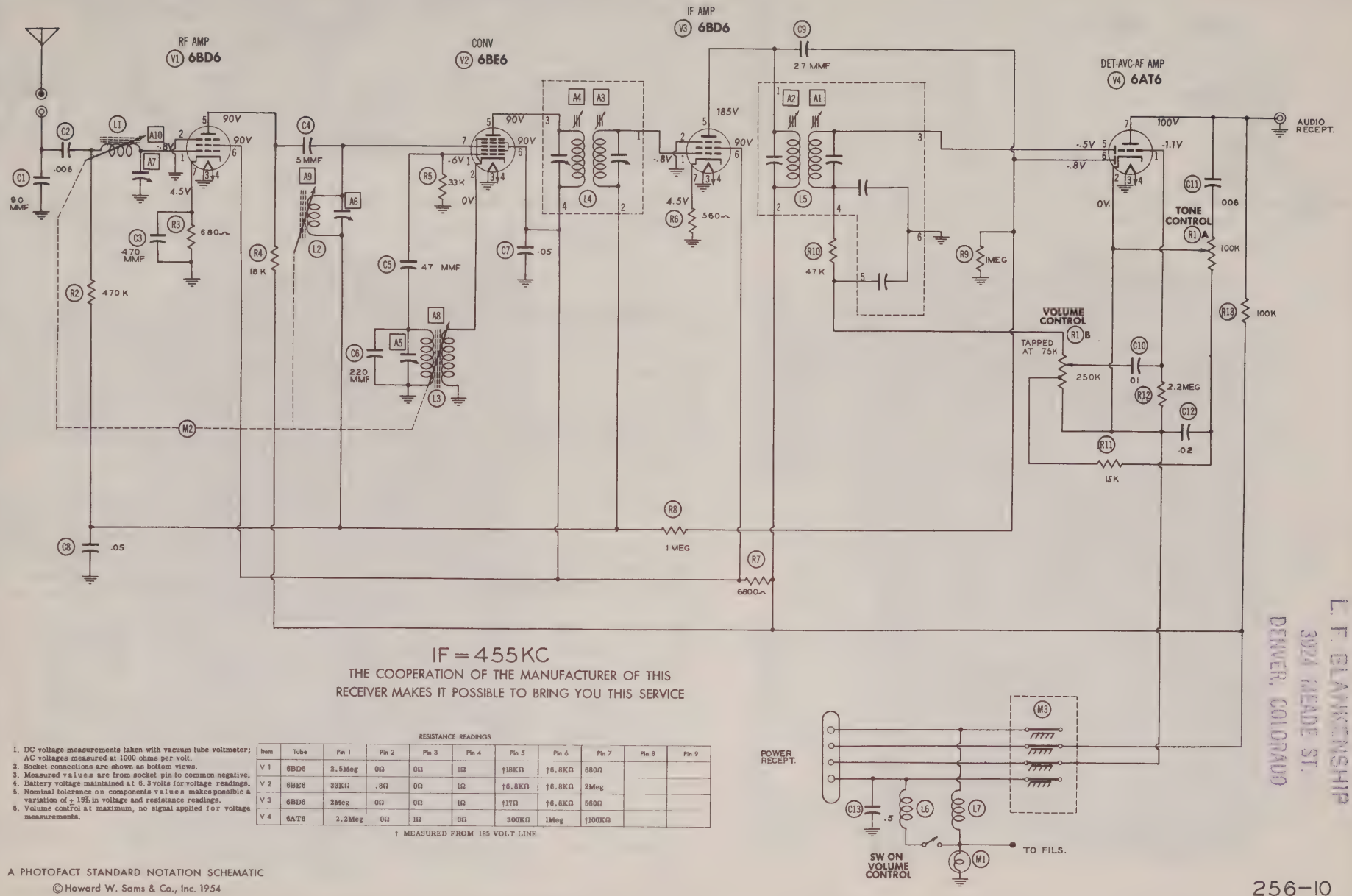


FIG. 1

TUNER PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS (cont)

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
	Push button	1V501247	5 used; chassis R15A6, Model KR3A6
	Push button	1V520079	5 used; chassis R15A6, Models PC2A6, SR3A6
	Push button	1V502355	5 used; chassis R15A6, Model PD3A6
	Glass	34B520516	Dial-chassis R15A6 Model BK3A6
	Glass	34B513332	Dial-chassis R15A6 Model CT2A6
	Glass	34B512735	Dial-chassis R15A6 Model GMT3A6
	Glass	34B513104	Dial-chassis R15A6 Model HN2A6
	Glass	34K520159	Dial-chassis R15A6 Model HJ3A6
	Glass	34B530359	Dial-chassis R15A6 Models HN3A6, HT3A6
	Glass	34B520225	Dial-chassis R15A6 Model KR3A6
	Glass	34B512205	Dial-chassis R15A6 Model OE2A6
	Glass	34B520076	Dial-chassis R15A6 Model PC2A6
	Glass	34B513122	Dial-chassis R15A6 Model PD3A6
	Glass	34B512992	Dial-chassis R15A6 Model SR2A6
	Glass	34B521786	Dial-chassis R15A6 Model SR3A6



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BD6	2.5Meg	0Ω	0Ω	1Ω	†18KΩ	†6.8KΩ	680Ω		
V 2	6BE6	33KΩ	.8Ω	0Ω	1Ω	†6.8KΩ	†6.8KΩ	2Meg		
V 3	6BD6	2Meg	0Ω	0Ω	1Ω	†17Ω	†6.8KΩ	560Ω		
V 4	6AT6	2.2Meg	0Ω	1Ω	0Ω	300KΩ	1Meg	†100KΩ		

† MEASURED FROM 185 VOLT LINE.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 6.3 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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256-10

TUNER SCHEMATIC

CH. P6-2 PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V5	Audio Output	6AQ5	6AQ5	7BZ	
V6	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C14A	■30	350	23A473015	AFH3-169		C131		FP331	TVL-3620	
B	▲30	300								
C	20	25								
C15	.02	400	8R12699	P488-02	DF-203	PTE4S2		PT412	4TM-S2	
C16	.006	400	8K71910	P688-006	D6-602	PTE6D6	GP2-333-602	PT626	6TM-D6	
C17	.02	1000	8K14137	P1088-02		PTE16S2		PT1612	MB-S2	
C18	.5	100	8K17028	P185-5		MP2P5		RF480	68P20	

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R15	220KΩ	½	6R6015	BTS-220K	
R16	270Ω	½	6R6432	BTS-270	
R17	3900Ω	2	6R476012	BTB-3900	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R18	56Ω	½	6R5614		
R19	56Ω	½	6R5614		

TRANSFORMER (VIBRATOR)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: MOTOROLA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	6.3VCT @5.4A	464VCT .043ADC			25K512083		P-3068 ①	TV-16K ①	V3803 ①	T-22R27①

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: MOTOROLA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T2	7.3KΩ	3.2Ω	25B502330	A-3878 ①	A-2931 ①	S-7X	Z1113	26S48 ①	① Drill one new mounting hole.

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L8	Vib. Hash Choke	0Ω		24A512119				47 Microhenries

FUSES

ITEM No.	TYPE	RATING	MOTOROLA PART No.: FUSE	MOTOROLA PART No.: HOLDER	LITTELFUSE PART No.: FUSE	LITTELFUSE PART No.: HOLDER	BUSS PART No.: FUSE	BUSS PART No.: HOLDER
M3	SFE	20A	65K4637	9K592646	307020	157020	SFE-20	HDJ-A

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	MOTOROLA PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	NOTES
M4	Int.	6.3V	115∿	48B3333	5342	859	5342	

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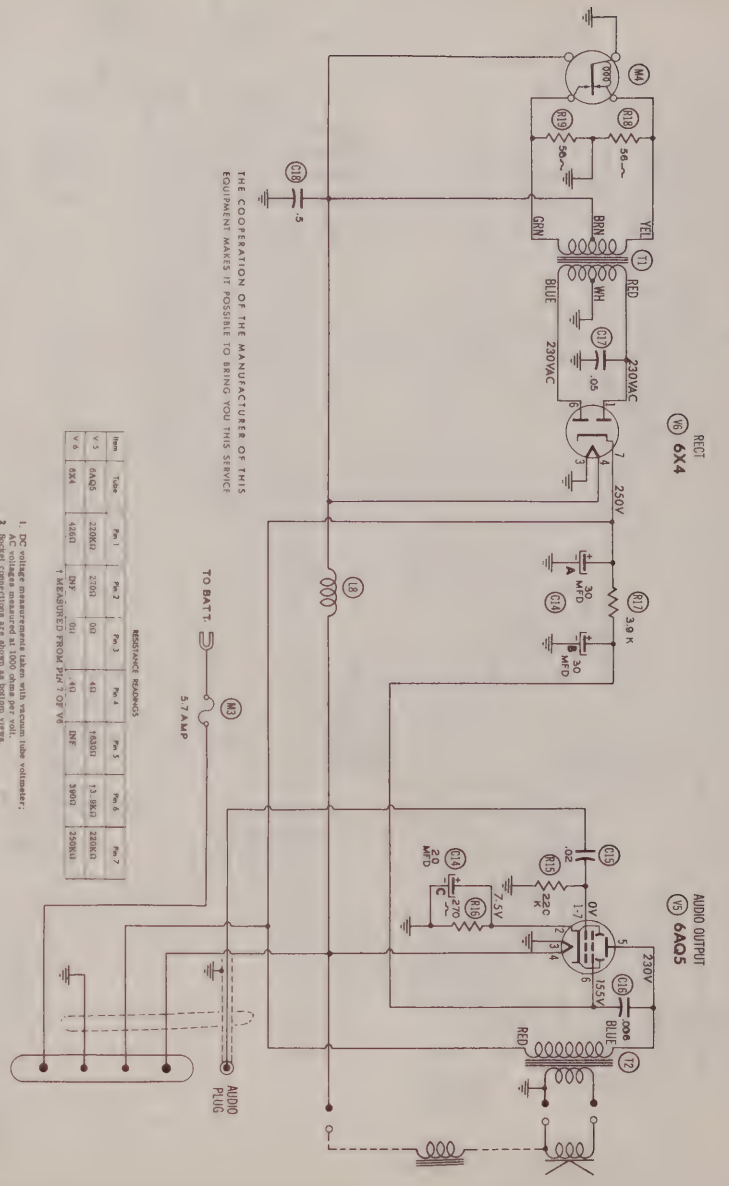

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measurements taken with 1000 ohms per volt meter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 6.3 volts for voltage readings.
5. Resistance measurements made with ohmmeter capable of variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

CH. P6-2

256-10

CH P8-2 PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		MOTOROLA PART No.	STANDARD REPLACEMENT		
V7	Phase Inverter	6AT6	6AT6	7BT	
V8	Audio Output	6AQ5	6AQ5	7BZ	
V9	Audio Output	6AQ5	6AQ5	7BZ	
V10	Rectifier	6X4	6X4	5BS	

CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C19A	■30	350	23A473015	AFH3-169		C131		FP331	TVL-3620	
B	▲30	300								
C	20	25								
C20	.02	400	8R12699	P488-02	DF-203	PTE4S2		PT412	4TM-S2	
C21	.02	400	8R12699	P488-02	DF-203	PTE4S2		PT412	4TM-S2	
C22	.003	1000	8R13165	P1088-003		PTE16D3		PT1623	MB-D3	
C23	.02	1000	8K114137	P1088-02		PTE16S2		PT1612	MB-S2	
C24	.5	100	8K17028	P185-5		MP2P5		RF480	68P20	

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R20	680Ω	½	6R6040	BTS-680	
R21	470KΩ	½	6R6377	BTS-470K	
R22	100KΩ	½	6R6075	BTS-100K	
R23	330KΩ	½	6R2096	BTS-330K	
R24	33KΩ	½	6R6410	BTS-33K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R25	180Ω	1	6R6390	BTA-180	
R26	1Meg	½	6R6004	BTS-1Meg	
R27	1500Ω	2	6R2005	BTB-1500	
R28	56Ω	½	6R5614		
R29	56Ω	½	6R5614		

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	MOTOROLA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T3	6.3VCT @5.4A	464VCT .043ADC			25K512083		P-3068 ①	TV-16K①	V3803 ①	T-22R27 ①

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T4	7KΩ CT	3.2Ω	25B502331	A-3823 ①	A-2900	S-51X	Z1113	26S48 ①	① Drill one new mounting hole.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L9	Vib. Hash Choke	0Ω		24A512119				47 Microhenries

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M5	SFE	20A	65K4637	9K592237	307020	157020	SFE-20	HDJ-A

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FRE-QUENCY	REPLACEMENT DATA				NOTES
				MOTOROLA PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M6	Int.	6.3V	115∿	48B3333	5342	859	5342	

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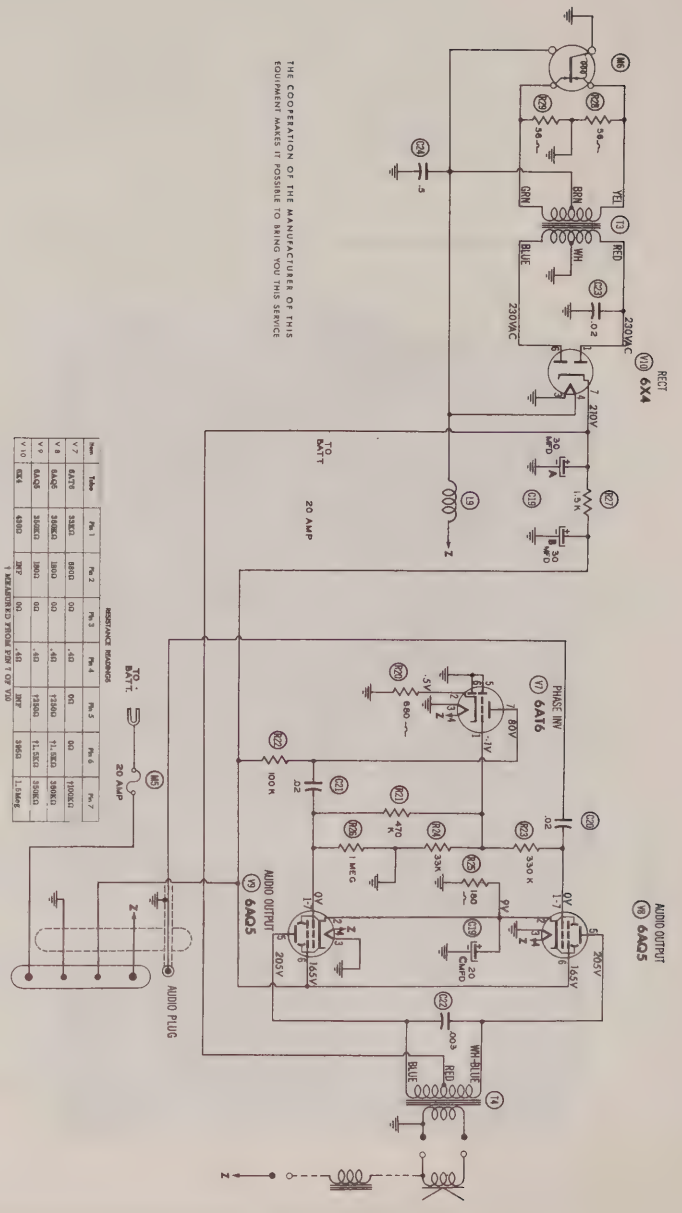
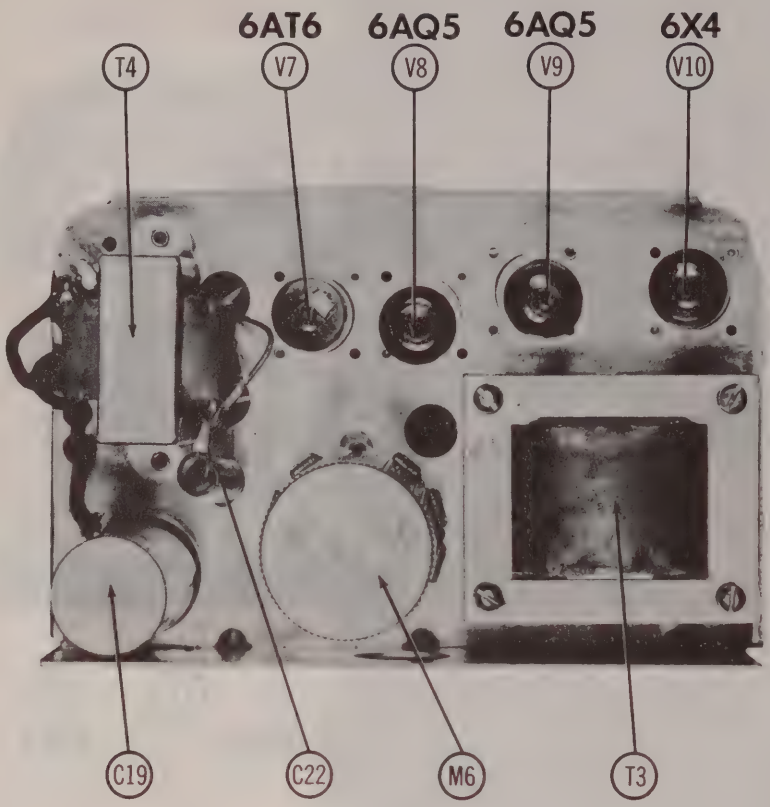
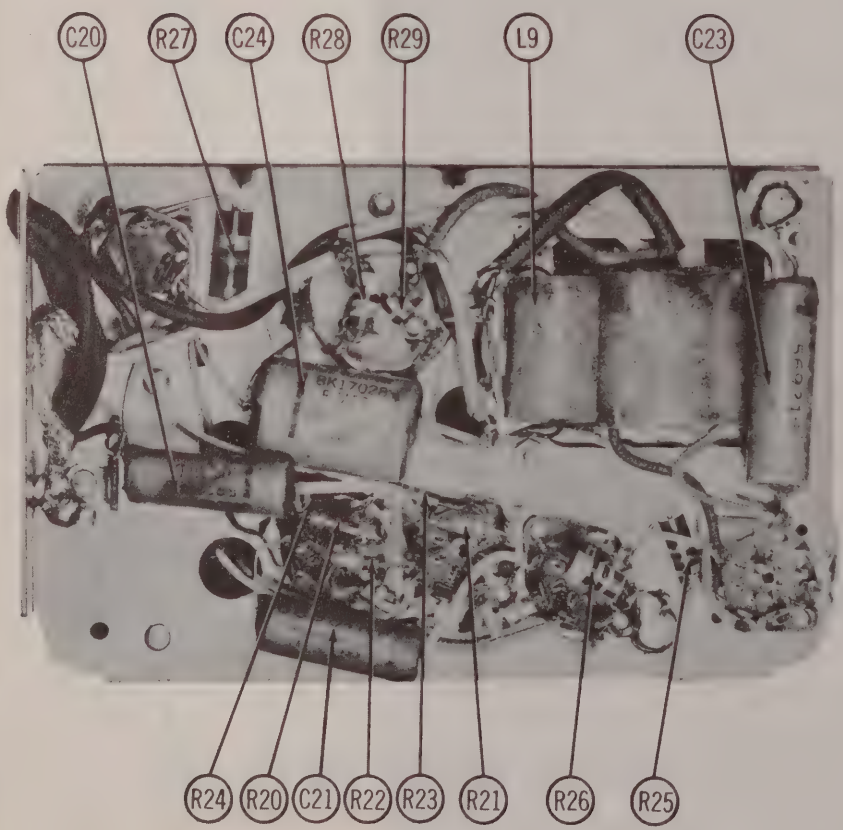




CHASSIS P8-2



CHASSIS P8-2

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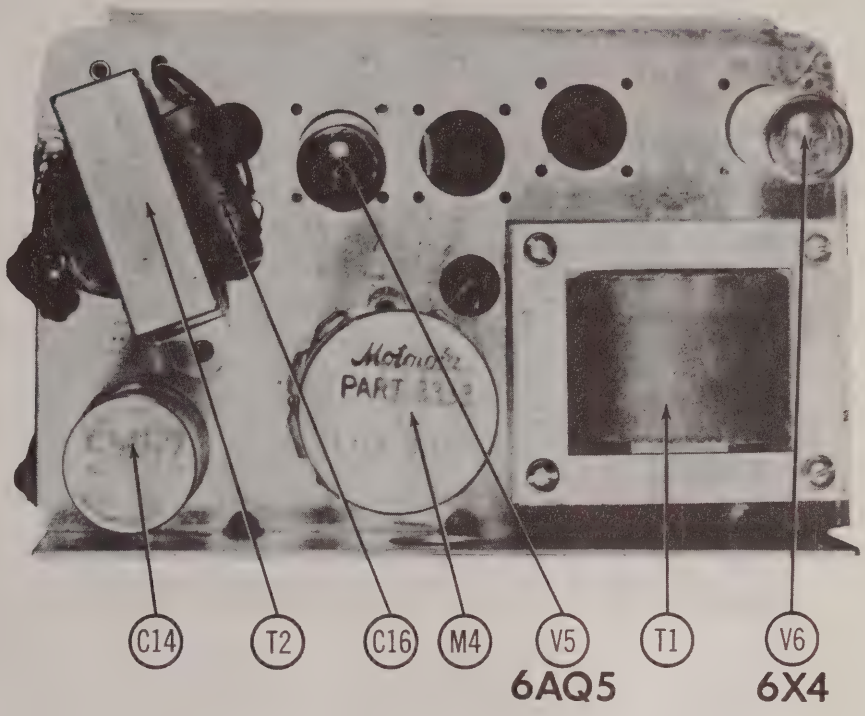

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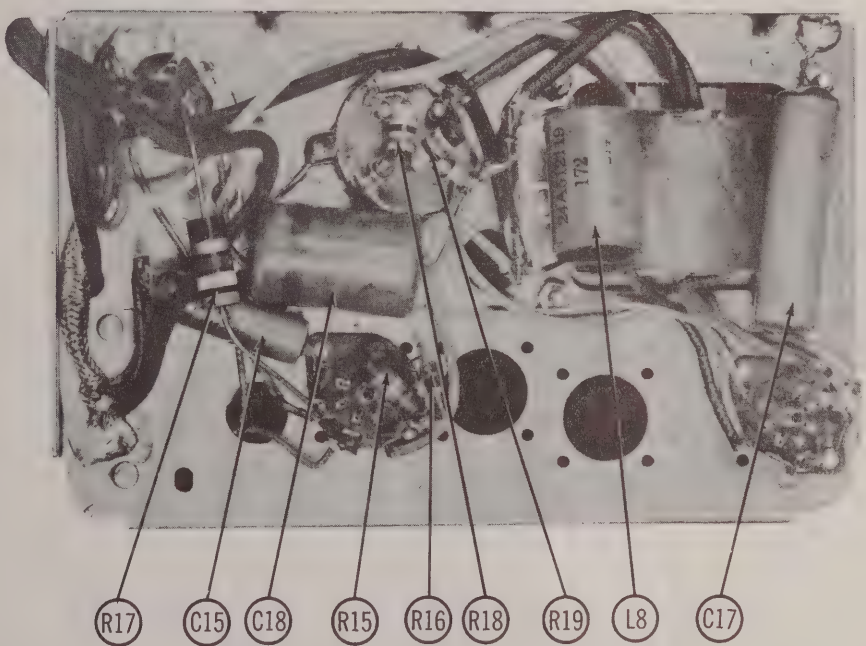

CHASSIS P6-2

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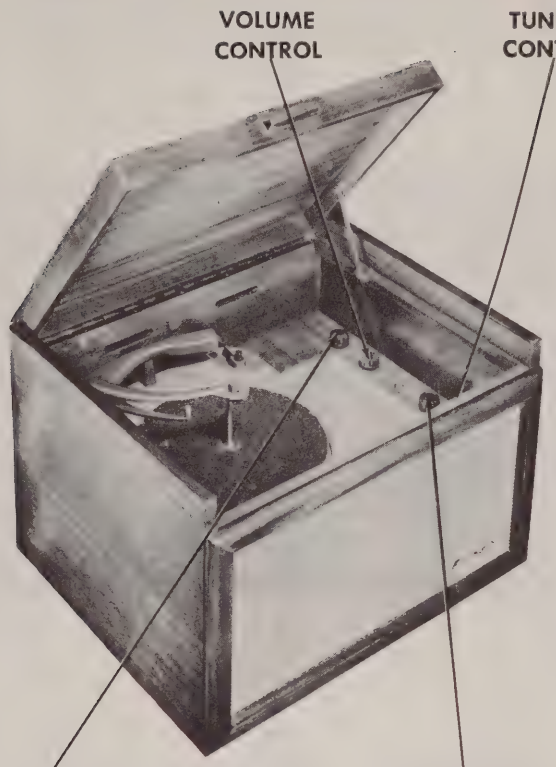
OLYMPIC
MODEL HF500



OLYMPIC
MODEL HF500

TRADE NAME	Olympic Model HF500
MANUFACTURER	Olympic Radio & Tel. Corp., 34-01 38th Ave., Long Island City, 1, N. Y.
TYPE SET	AC Operated Radio-Phono Combination Superheterodyne Receiver with 3 Speed Automatic Record Changer.
TUBES (Six)	Types 12SA7 Conv., 12SK7 IF Amp., 12SQ7 Det.-AVC-AF Amp., 12AV6 Phase Inverter, (2) 35L6GT Audio Output
POWER SUPPLY	105-125 Volts AC-60 Cycles
RATING	.4 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

With tuning gang fully closed, set pointer to coincide with the left edge of the rectangle surrounding the calibration points on the dial scale.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to antenna stator lug on tuning gang. Low side to B-.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.		Loop	1500KC	1500KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1500KC	Tune to 1500KC	"	A6	Adjust for maximum output. Repeat steps 2 and 3.

RECORD CHANGER UNIT-WEBSTER-CHICAGO MODEL 114

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PARTS LIST AND DESCRIPTIONS

OLYMPIC MODEL HF500

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12SA7	12SA7	8R	
V2	IF Amplifier	12SK7	12SK7	8N	
V3	Det.-AVC-AF Amp	12SQ7	12SQ7	8Q	
V4	Phase Inverter	12AV6	12AV6	7BT	
V5	Audio Output	35L6GT	35L6GT	7S	
V6	Audio Output	35L6GT	35L6GT	7S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: OLYMPIC PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	300	C03151	AFH3-43		C034		FP398	TVL-3785	
B	■40	300								
C	▲10	300								
C2	40	150	C03152	E26D221				TC492	R1551	Note 1, 2
								TC492		
C3	2	200	C03167	E26A505				TC50X	R1552	Note 1, 2
								TC50X		
C4	.02	600		P688-02	DF-203	CUB6S2		PT612	6TM-S2	
C5	100	500		1468-0001		5W5T1		MCB235	1FM-31	
C6	.1	400		P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C7A	150		†PC-2478	†PA-98	†PC-51	†1111TM2	†1403-02	UC-5315	†D-2	
B	150							UC-5315		
C8	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C9	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C10	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C11	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C12	.0047	600		P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C13	.047	400		489ZX-047	DF-503	CUB4S47		PT4147	4TM-S47	
C14	.047	400		P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C15	.22	400		P488-22		CUB4P22		PT4022	4TM-P22	

† Items C7A, C7B and R6 are combined in one unit.
Note 1. Connect negative leads of Mallory unit together and positive leads to original terminals.
Note 2. Non-polarized unit. Replace with same type.

CONTROLS

ITEM No.	RATING: RESIST-ANCE	RATING: WATTS	REPLACEMENT DATA: OLYMPIC PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	3Meg	½	PT-2160		A47-3Meg-Z	AB-85	U-57	Tone
B	Shaft		Not Req.		KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.		SWE-12	KB-3	US-28	Attach to R1A
R2A	2Meg	½	PT-567	Q13-139X	AT-115	ABT-80	UT-449	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A

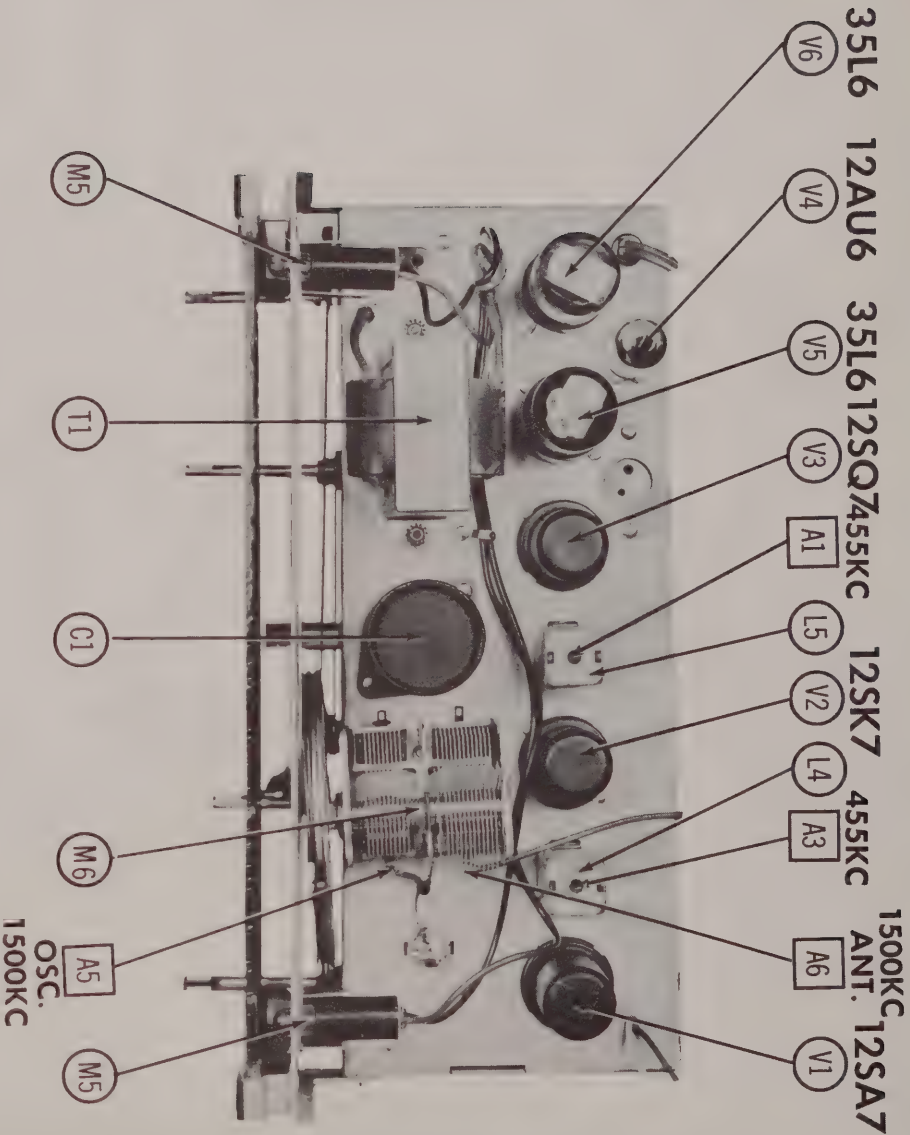
RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: OLYMPIC PART No.	IRC PART No.	NOTES
R3	22KΩ	½		BTS-22K	
R4	2.2Meg	½		BTS-2.2Meg	
R5	470KΩ	½		BTS-470K	
R6	47KΩ	½	†PC-2478	BTS-47K	
R7	220KΩ	½		BTS-220K	
R8	6.8Meg	½		BTS-6.8Meg	
R9	220KΩ	½		BTS-220K	
R10	6.8Meg	½		BTS-6.8Meg	
R11	220KΩ	½		BTS-220K	
R12	470KΩ	½		BTS-470K	
R13	150Ω	1		BTA-150	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: OLYMPIC PART No.	IRC PART No.	NOTES
R14	470KΩ	½		BTS-470K	
R15	1Meg	½		BTS-1Meg	
R16	1Meg	½		BTS-1Meg	
R17	220KΩ	½		BTS-220K	
R18	5000Ω	10	RE-2995		
R19	5000Ω	10	RE-3255	1 3/4A-500	
R20	20Ω	5	RE-3199	1 3/4A-20	
R21	10Ω	2			
R22	*				
R23	10KΩ	½		BTS-10K	

* Special resistor 95Ω @ 38 degrees cent., 13.5Ω @ 104 degrees cent.
† Items R6, C7A, C7B are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: OLYMPIC PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	10.2K ΩCT	4.8Ω	TR-3159	A-3830	A-2901 ①	S-55X	Z1003 ①	24S61 ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: OLYMPIC PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	5"	PM	11.7Ω	SK-3147		5A15T	
SP2	8"	PM	3.1Ω	SK-3148	ST-115 Mod. P8-V	8A6Z3.2	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: OLYMPIC PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Loop Ant.	1.2Ω		LP3190				Includes cab. back - 12 turns # 20 wire sound on a 1MFD-400V Cap.
L2	RF Choke	0Ω						
L3	Osc. Coil	.5Ω	6.5Ω	CL2709	14-1073		69-Osc. *	
L4	Input IF	15Ω	15Ω	TR1644	16-6758	BC-352	12-C1	
L5	Output IF	15Ω	15Ω	TR1644	16-6758	BC-353	12-C2	

* Drill mounting hole.

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA: OLYMPIC PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	SELETRON PART No.	NOTES
M1	.077ADC	RF3160	1005A	RS100	6S150	150	5P1	
M2	.077ADC	RF3160	1005A	RS100	6S150	150	5P1	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: OLYMPIC PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	SHURE PART No. CARTRIDGE	SHURE PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	REMARKS
M3		ACD-J	A-1 A-3	W22AB	A65MG A62A	96T	0-1 or S-1 and 0-3	

ASTATIC, SHURE AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED, FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

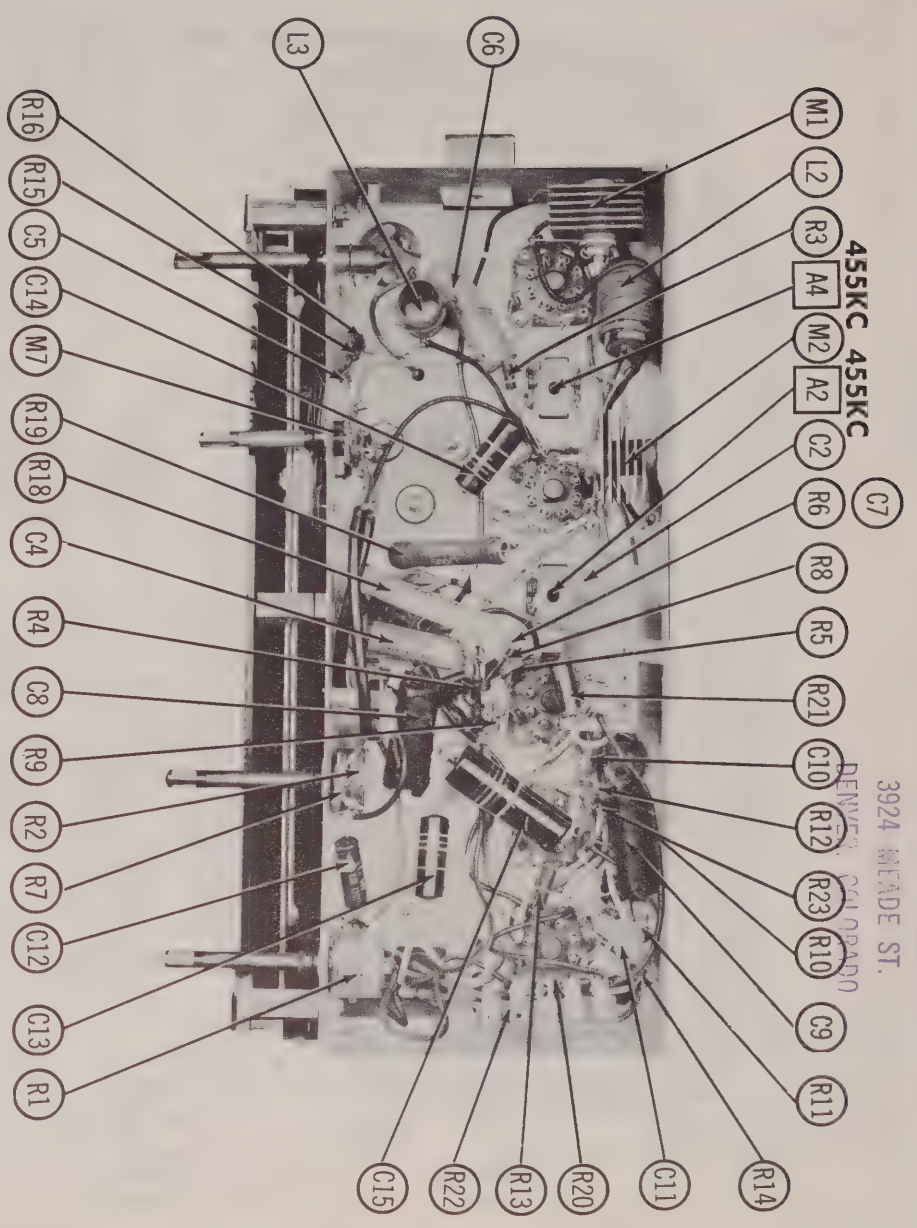
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA: OLYMPIC PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M4		†JPS-30LP or *JP-30LP & *JP-30 or †JPS-30	*A-322 or †A-300 or ♦A-300D & *C-320 or †C-318 or ♦C-318D	†W-30MGS or *W-30MGA & *W-30A or †W-30S	* Metal † Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	OLYMPIC PART No.	NOTES
M5	Dial light	BU-2688	Bayonet-1490 (2 used)
M6	Tuning cap.	CV-2681	24-447 MMF, 30-195MMF
M7	Switch	SW-437	Radio-phono
	Knob	KN-423	On-off tone, walnut
	Knob	KN-3164	On-off tone, ivory
	Knob	KN-422	Volume, walnut
	Knob	KN-3163	Volyme, ivory
	Knob	KN-425	Tuning, walnut
	Knob	KN-3105	Tuning, ivory
	Knob	KN-3010	Radio-phono, walnut
	Knob	KN-3166	Radio-phono, ivory
	Dial glass	DL-3154	
	Pointer	PO-1011	

CHASSIS—BOTTOM VIEW



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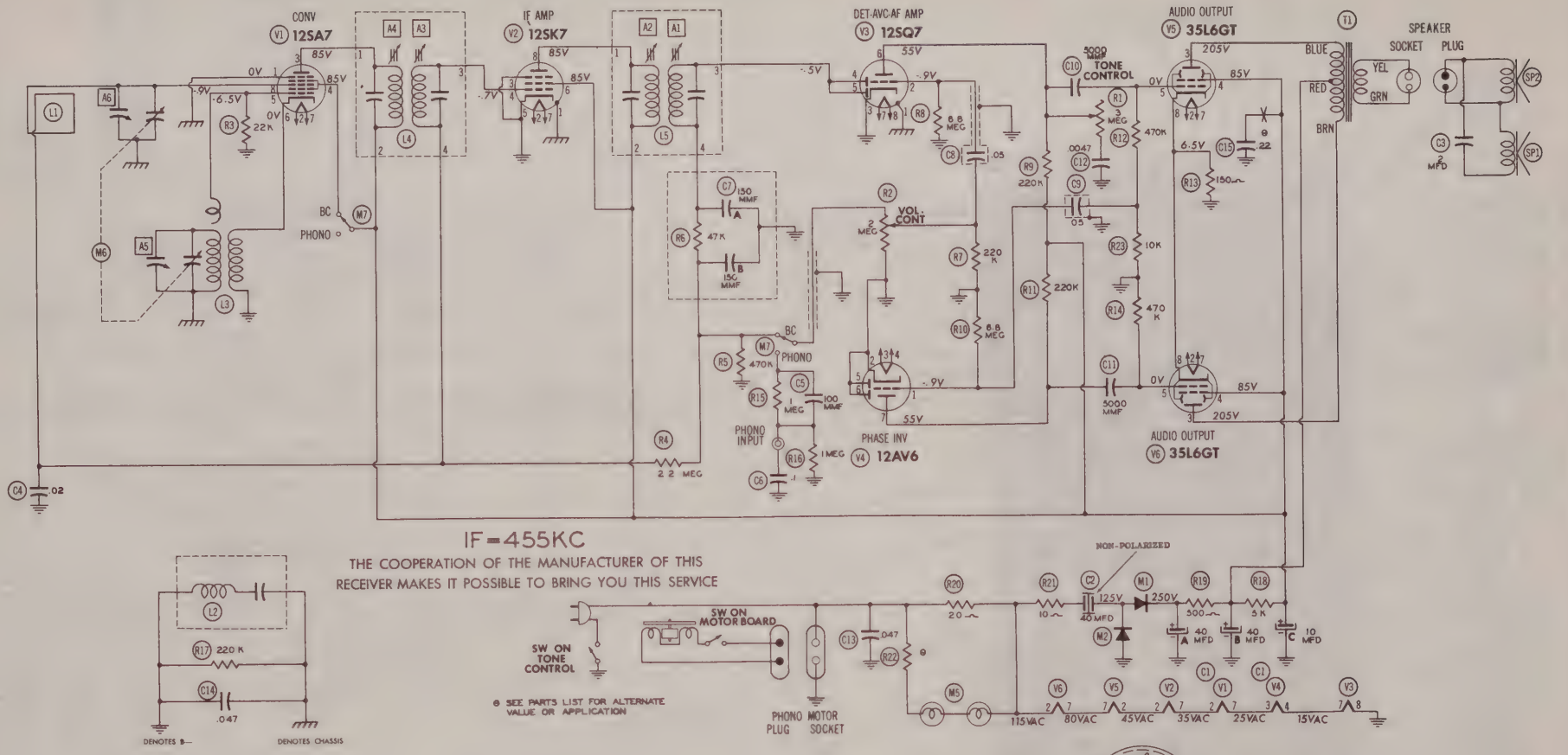
OLYMPIC
MODEL HF500



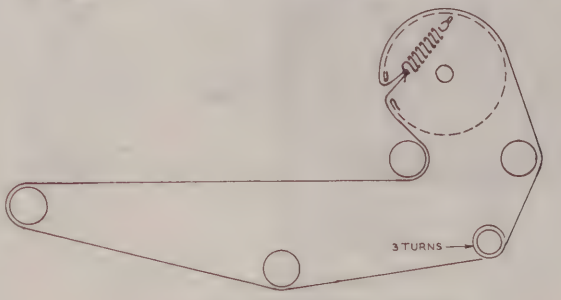
⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SA7	220KΩ	40Ω	†5.5KΩ	†5.5KΩ	22KΩ	.5Ω	27Ω	3.7Meg
V 2	12SK7	220KΩ	53Ω	0Ω	2.7Meg	0Ω	†5.5KΩ	40Ω	†5.5KΩ
V 3	12SQ7	220KΩ	6.8Meg	0Ω	515KΩ	515KΩ	†220KΩ	14Ω	0Ω
V 4	12AV6	6.8Meg	0Ω	27Ω	14Ω	0Ω	0Ω	†220KΩ	
V 5	35L6GT	INF	53Ω	†1KΩ	†5.5KΩ	480KΩ	0Ω	90Ω	150Ω
V 6	35L6GT	0Ω	125Ω	†1KΩ	†515KΩ	470KΩ	INF	90Ω	150Ω

† MEASURED FROM C1A (POSITIVE TERMINAL).

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.



DIAL CORD STRINGING

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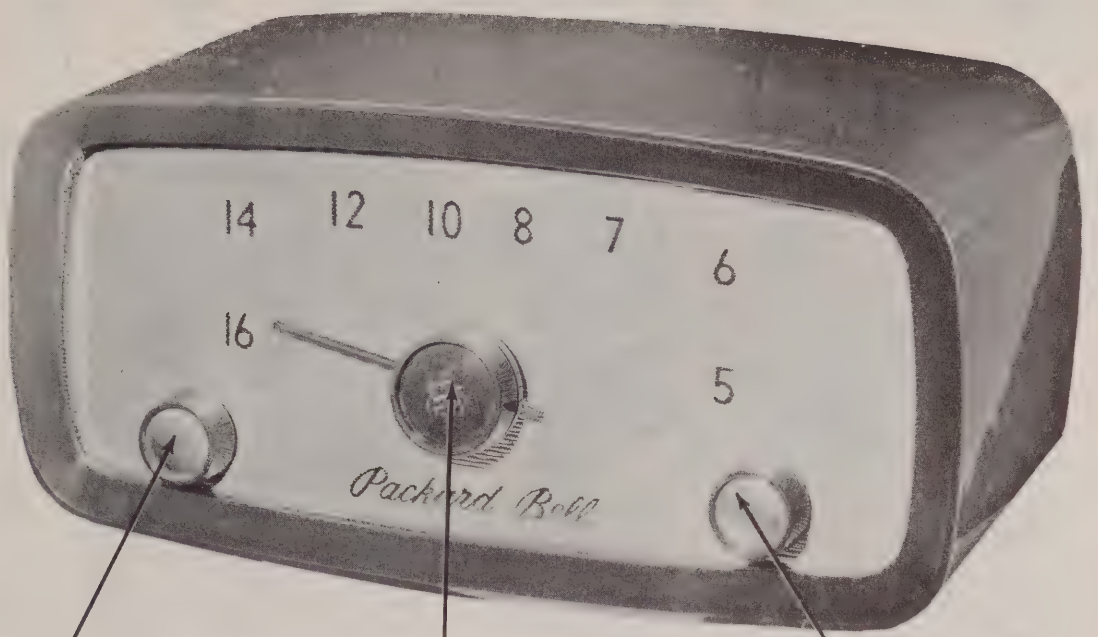
PACKARD BELL
MODEL 631



PACKARD BELL
MODEL 631

TRADE NAME	Packard-Bell Model 631
MANUFACTURER	Packard-Bell Co., Service Div., 11th & Hope Sts., Los Angeles 15, Calif.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Six)	Types 6BJ6 RF Amp., 12BE6 Conv., 6BJ6 IF Amp., 12AV6 Det. -AVC-AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC RATING .21 Amp. ② 117 Volts AC
TUNING RANGE—BROADCAST	540-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 7 (grid) of 12BE6 (V2). Low side to B-.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.		Loop	1620KC	"	"	A5	Fashion loop of several tuns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1500KC	Tune to 1500KC signal.	"	A6, A7	"

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PARTS LIST AND DESCRIPTIONS

PACKARD-BELL MODEL 631

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: Packard Bell PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BJ6	6BJ6	7CM	
V2	Converter	12BE6	12BE6	7CH	
V3	IF Amplifier	6BJ6	6BJ6	7CM	
V4	Det-AVC-AF Amp.	12AV6	12AV6	7BT	
V5	Audio Output	50C5	50C5	7CV	
V6	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: Packard Bell PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	50	150	24073	PRS150/50-50		BBRD5515		TCD49	TVA-2453	Red
B	50	150								Blue
C2	.047	200	23017	P288-047	DF-503	PJ2S47		PT4147	2TM-S47	
C3	47		23912	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C4	5000		23931	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C5	220		23915	BPD-00022	DD-221		801-00022	UC-5322	5GA-T22	
C6	.047	200	23017	P288-047	DF-503	PJ2S47		PT4147	2TM-S47	
C7	220		23915	BPD-00022	DD-221		801-00022	UC-5322	5GA-T22	
C8	10000		23939	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C9	5000		23931	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C10A	100		♦ 23930	♦ PA-97-1	♦ PC-50	♦ 111TM1	♦ 1403-01	UC-531	♦ D-4	
B	100							UC-531		
C11	5000		23931	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	Note 1
C12	10000		23939	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C13	10000		23935	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C14	.047	200	23017	289ZX-047	DF-503	PJ2S47		PT4147	2TM-S47	
C15	.15	200	32028	P288-15		PJ2P15		PT4015	2TM-P15	

Note 1. Some models may use a 2000MMF in this application.
♦ Items C10A, C10B and R9 are combined in one unit.

CONTROLS

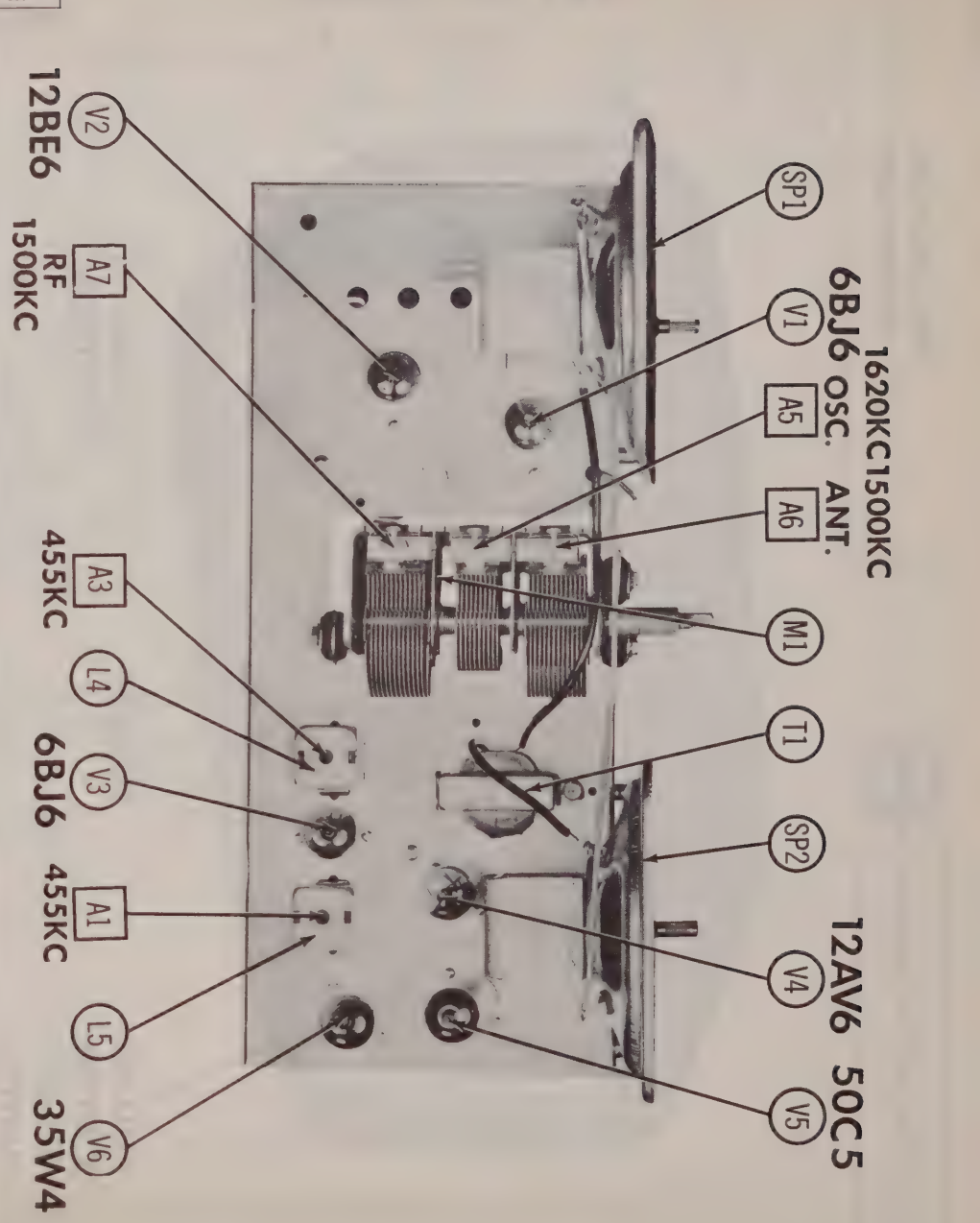
ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: Packard Bell PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	25514X	Q11-133	A47-500K-S	AB-59	U-41	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
R2A	500KΩ	½	25029	Q13-133X		ABT-66	UT-429	Volume-tapped @ 80K
B	Shaft		Not Req.	Not Req.		AK-4	Not Req.	Attach to R2A
C	Switch		Not Req.	76-1		KB-1	US-26	Attach to R2A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: Packard Bell PART No.	IRC PART No.	NOTES
R3	220Ω	½	73017	BTS-220	
R4	4700Ω	½	73033	BTS-4700	
R5	22KΩ	½	73041	BTS-22K	
R6	2.2Meg	½	73165	BTS-2.2Meg	
R7	220Ω	½	73017	BTS-220	
R8	33KΩ	½	73043	BTS-33K	
R9	47KΩ	½	♦ 23930	BTS-47K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: Packard Bell PART No.	IRC PART No.	NOTES
R10	4.7Meg	½	73169	BTS-4.7Meg	
R11	470KΩ	½	73157	BTS-470K	
R12	470KΩ	½	73157	BTS-470K	
R13	150Ω	½	73105	BTS-150	
R14	1000Ω	1	73225	BTA-1000	
R15	68Ω	½	73011	BTS-68	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Packard Bell PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	2.3KΩ	5.6Ω	89445	A-3849 ①	A-2902 ①	S-12X	Z1001 ①	22S88 ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Packard Bell PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	2.8Ω	83013	ST-113 Mod. P4-X	4A1	2 speakers used in series
SP2	4"	PM	2.8Ω	83013	ST-113 Mod. P4-X	4A1	

COILS (RF-IF)

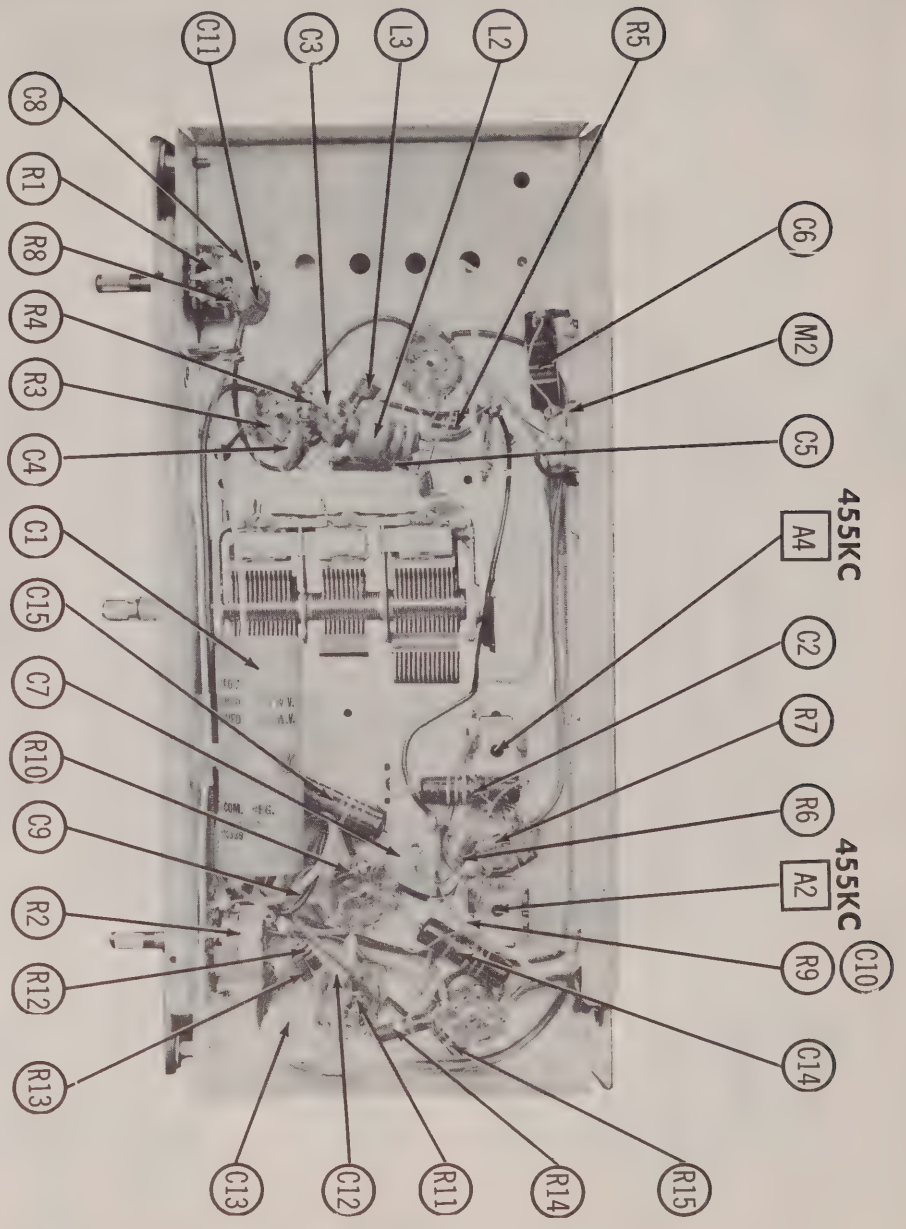
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Packard Bell PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	0Ω	2.3Ω	29346				Includes cab. back
L2	RF Amp. Coil	45Ω	7.5Ω	29119	14-1072	BC-382	70RF	
L3	Osc. Coil	5Ω		29224	14-1033	BC-400	5481-C	Tapped ⓐ .5Ω
L4	Input IF	19Ω	19Ω	29066	16-6758	BC-352	12-C1	
L5	Output IF	15Ω	15Ω	29067	16-6758	BC-352	12-C2	

♦ Items R9, C10A, C10B are combined in one unit.

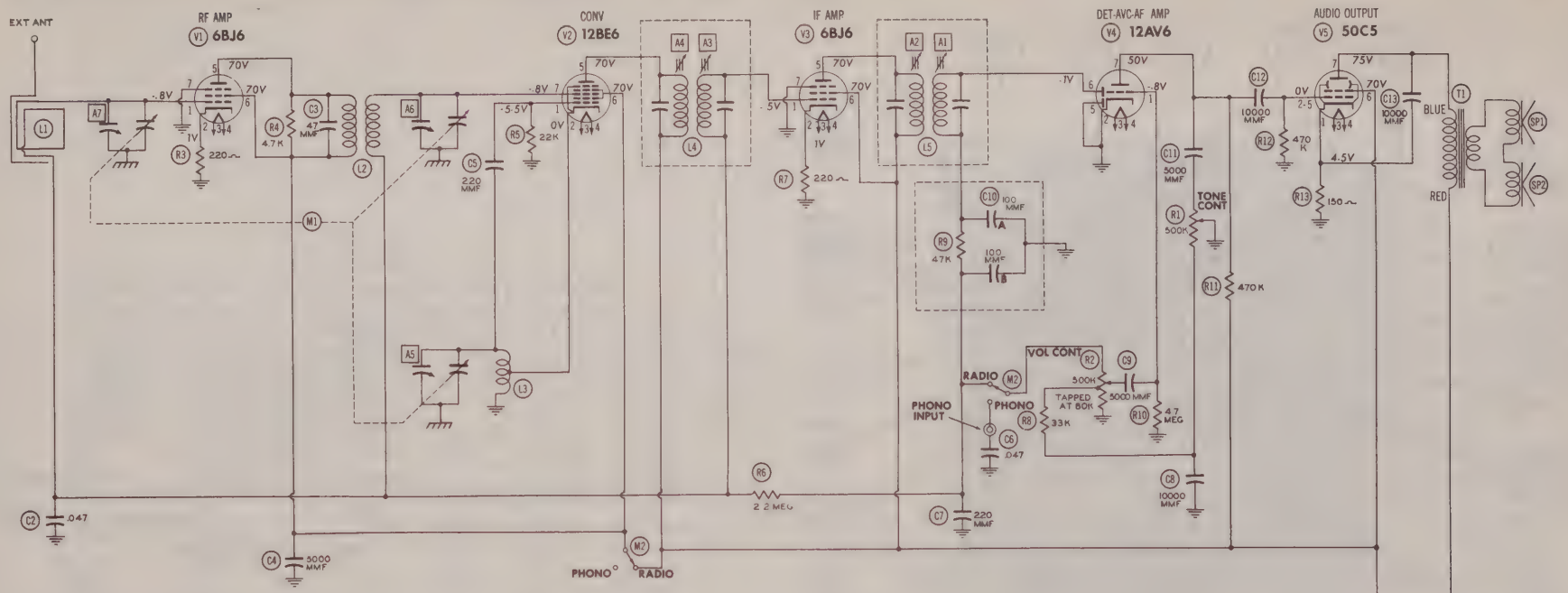
MISCELLANEOUS

ITEM No.	PART NAME	Packard Bell PART No.	NOTES
M1	Tuning capacitor	23532	33-445, 33-445, 34-210MMF
M2	Switch		Phono-Radio
	Cabinet	631	Specify color
	Knob	52092AL	Ivory-Tuning
	Knob	52092AB	Brown-Tuning
	Knob	52093AL	Tone & Volume-Ivory
	Knob	52093AB	Tone & Volume-Brown
	Knob	52091AL	Tuning Pointer-Ivory
	Knob	52091AB	Tuning Pointer-Brown
	Dial	38136	

CHASSIS—BOTTOM VIEW

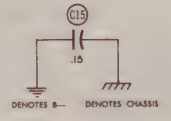


PACKARD-BELL MODEL 631



IF = 455KC

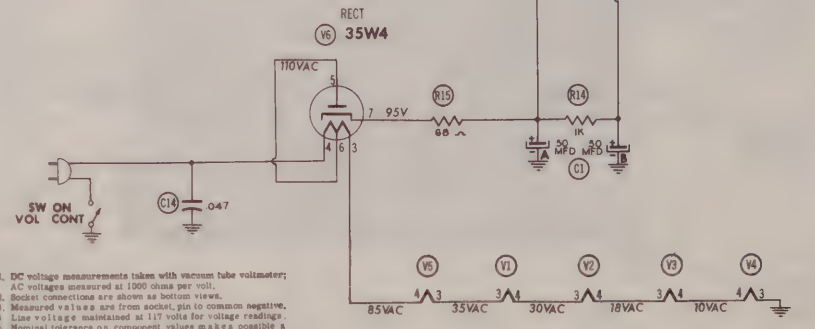
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6BJ6	2. 7Meg	220Ω	38Ω	30Ω	† 4. 8KΩ	† 1. 1KΩ	0Ω
V 2	12BE6	22KΩ	. 5Ω	30Ω	20Ω	† 1. 1KΩ	† 1. 1KΩ	2. 7Meg
V 3	6BJ6	2. 7Meg	220Ω	20Ω	14Ω	† 1. 1KΩ	† 1. 1KΩ	0Ω
V 4	12AV6	4. 7Meg	0Ω	0Ω	14Ω	0Ω	550KΩ	† 470KΩ
V 5	50C5	150Ω	470KΩ	38Ω	90Ω	470KΩ	† 1. 1KΩ	† 272Ω
V 6	35W4	† 68Ω	INF.	90Ω	130Ω	120Ω	120Ω	200KΩ

† MEASURED FROM PIN 7 OF V6.



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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256-12

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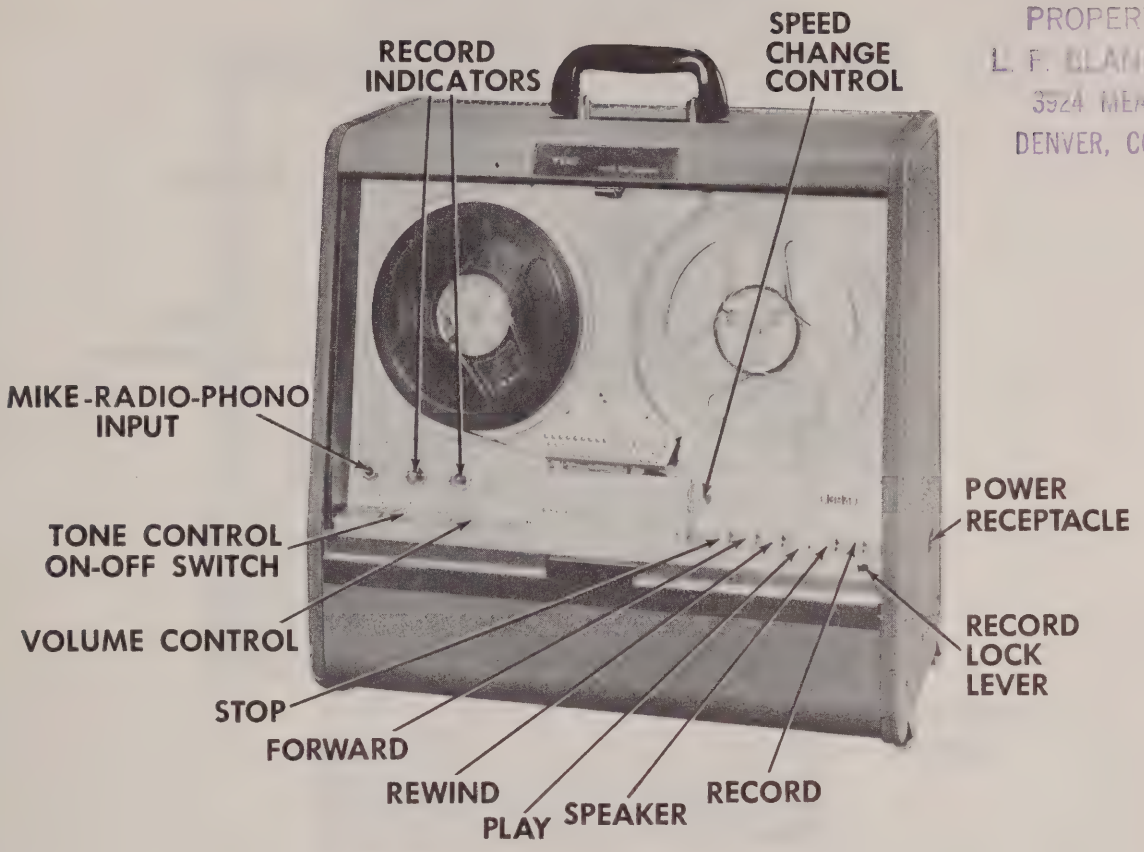

Figure 1

GENERAL INFORMATION

The Model 130 Stereotone Tape Recorder features Stop, Forward, Rewind, Play and Record modes of operation merely by pressing a button. A Speaker push button is also provided for monitoring programs or for using the recorder as a P.A. system. The "Stereotone" uses double-track recording, giving two full length recordings on a single reel of recording tape. Any reel size up to 7" can be used. Two neon recording indicators simplify the recording level setting. New recordings can be made on previously recorded tape since the erase head is automatically connected when the "Record" button is pressed or the same recording may be played back indefinitely. Recordings can be made from a radio, television receiver or phonograph, in addition to those made directly from the microphone. Recordings can be played back through the self-contained speaker or an external speaker through use of the Speaker Jack.

Model 130 is designed to operate on 60 cycle, 115 volts, AC supply only.

CAUTION: Severe Damage Will Result If Connection Is Made To A Direct Current (DC) Line.

Manufactured by:

Three Dimension Company
3512 North Kostner Avenue
Chicago 41, Illinois

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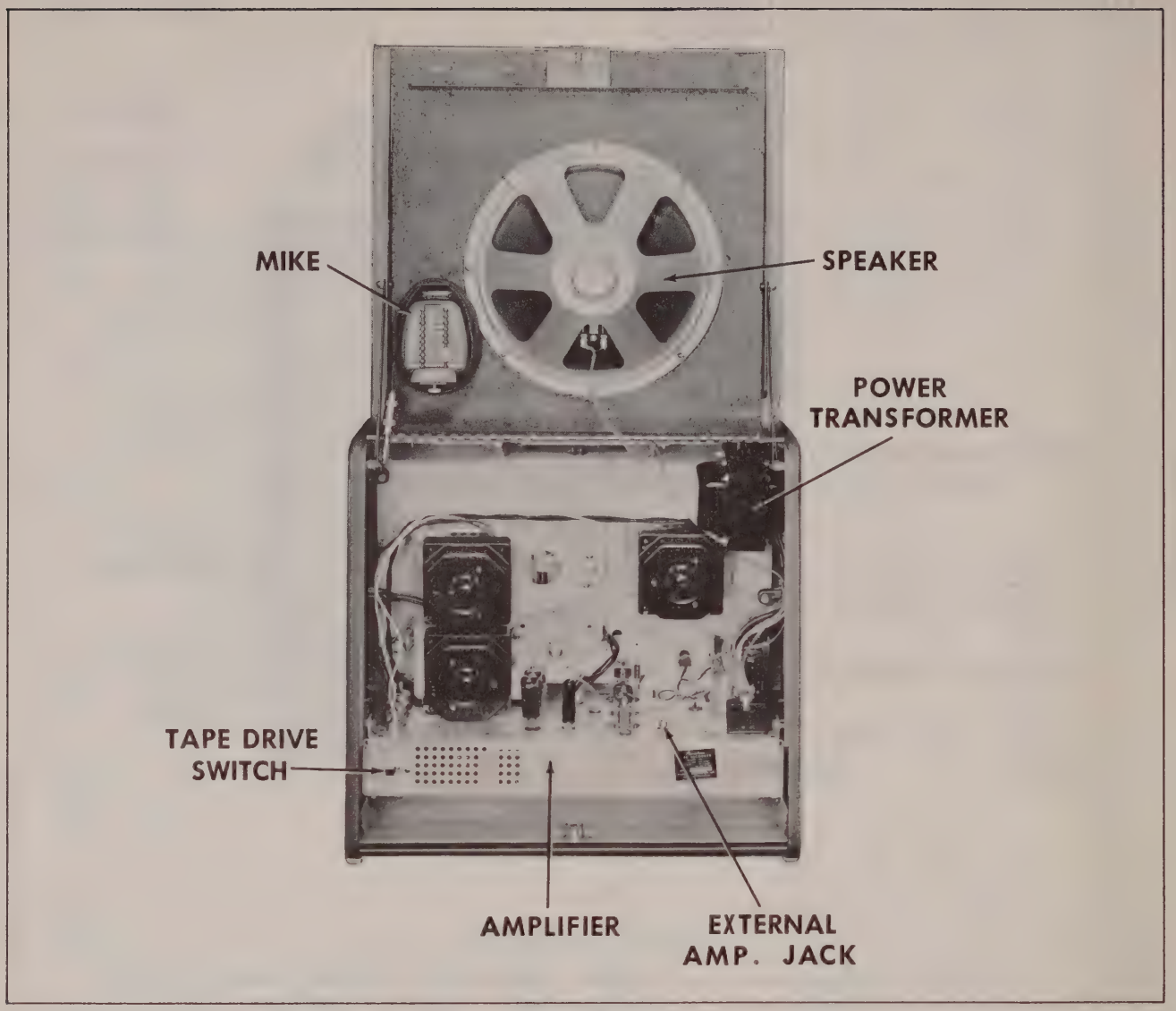

Figure 2

SPECIFICATIONS

Weight-
38 lbs. approximately.

Size-
16 1/2" h. x 17" w. x 9 1/2" d.

Reel Size-
Up to 7".

Tracks-
Dual.

Track Selection-
Manual turnover.

Tape Loading-
Drop-in-slot type.

Tape Speed-Play And Record-
7 1/2 and 3 3/4 ips.

Fast Forward-
7" reel in 90 seconds.

Fast Rewind-
7" reel in 90 seconds.

Recording Time (7" reel)-
1 hour at 7 1/2 ips. (1/2 hour each track)
2 hours at 3 3/4 ips. (1 hour each track)

Overall Frequency Response-
(Record To Playback At 7 1/2 ips.)
± 2db from 50 to 10,000 cps.

Distortion-
Less than 3% at 4 watts.

Power Output-
8 watts.

Wow And Flutter-
(At 7 1/2 ips.)
Less than 0.2%.

Audio Inputs-
Microphone, Radio, Phono, TV.

Audio Outputs-
(a) Internal or Extension Speaker.
(b) External Amplifier.

Controls-
3 knobs, 6 electric pushbuttons.

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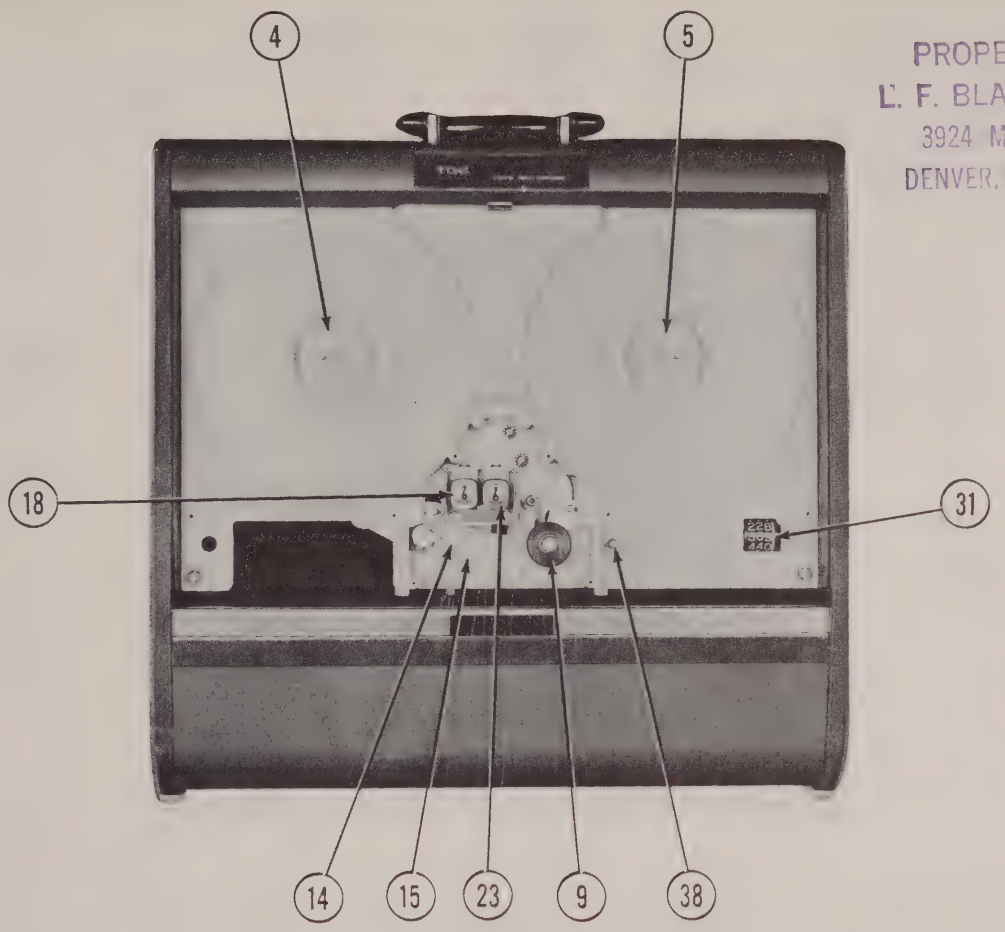

Figure 3

OPERATING INSTRUCTIONS

Making Connections-

Turn the "Tone" control to the left to "Off" and insert the power cord into the power receptacle on the right side of the cabinet. Plug the other end of the power cord into a convenient wall outlet of the proper rating.

Threading The Tape-

With the "Stop" button depressed, place an empty reel on the right hand (take-up) spindle. Place a full reel of tape on the left hand (supply) spindle so that the reel will turn counterclockwise when tape is pulled from the reel. Make certain that the r -l springs on the spindles engage one of the slots in the hubs of the reels and that the reels are fully seated. Reel out about two feet of tape and feed the loose end up into the empty reel on the right spindle. Thread the tape into one of the slots in the outer surface of the hub. Hold the loose end between the fingers and slowly rotate this reel counterclockwise through a couple of revolutions. While taking up slack in the tape between the two reels the tape will automatically drop into the tape slot.

To Record From Microphone-

1. Insert the microphone plug into the "Mic. - Radio-Phono" input jack.

2. Turn the "Off-Tone-On" control to the right until a click is heard and allow approximately 30 seconds for the unit to warm up. "Power on" condition is indicated by indirect illumination of the lucite knobs from behind the front panel.

3. Unlock and push the "Record" button. Observe the "Record Level" indicator lamps while speaking into the microphone. Occasional flickering of the "Distortion" lamp indicates a good, high level of recording, however, continuous glowing or flashing in this lamp indicates that the "Volume" control setting must be reduced. Be sure that the "Normal" lamp glows fairly full and steady or you may not be recording properly, if at all.

NOTE: The "Tone" control is inoperative when recording.

Mic.-Radio-Phono Input-

This two-circuit, front-panel input jack provides a 220,000 ohm high-impedance input for the microphone and a low-impedance input for recording from a radio, phonograph or TV set. A two-conductor attachment cord is supplied in the storage compartment. This cord is terminated at one end with a jack plug and at the other with two alligator clips to enable you to make connection to various equipment for recording or monitoring.

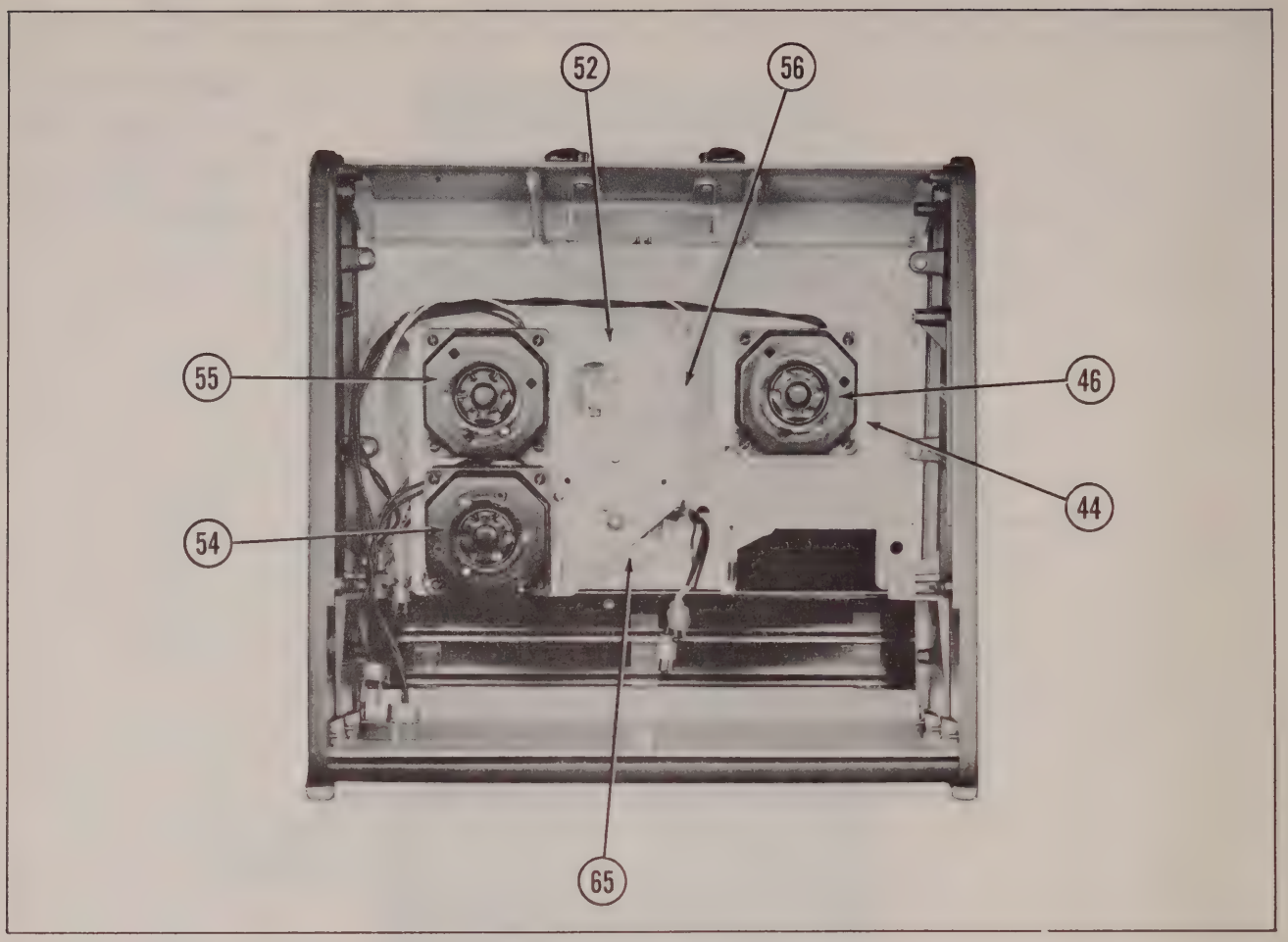

Figure 4

To Record From Radio, TV, Or Phonograph-

1. Take the radio-phono attachment cord from the storage compartment.

2. Turn off power to the recorder.

3. With the two alligator clips on the end of the radio-phono attachment cord, connect across the amplifier output or voice coil on the speaker of the radio, phono, or TV set.

4. Insert the plug of the radio-phono cord into the Mic.-Radio-Phono input jack on the front panel of the Stereotone.

5. Proceed with the recording as described in "To Record From Microphone".

Double-Track Recording-

The Stereotone is designed so that only 1/2 the tape width is recorded at a time, thereby resulting in double-track recording. This double-track operation is accomplished in the following manner:

1. After a reel of tape has been recorded, i.e. all the tape wound on to the take-up reel, depress the "Stop" button. This stops all movement of the tape.

2. Remove the reels from the recorder, turning the full reel over and placing it on the left spindle and the empty reel on the right spindle.

3. Properly thread the tape and proceed with the recording.

4. After the second track has been recorded the first track is ready to be played, without rewinding, as follows:
   (a) Place the full reel of tape on the left spindle and the empty reel on the right spindle.

   (b) Thread the tape making sure the dull side faces the play-record head.

   (c) Set the controls as described under "To Play A Recording".

To Play A Recording-

1. Thread the tape as described under "Threading The Tape".

2. Turn the "Off-Tone-On" control to the right and allow about 30 seconds for warm up.

3. Depress the "Play" button until it is latched into position.

4. Adjust the "Volume" and "Tone" controls for desired level.

To Edit And Splice Tape-

NOTE: Since it is impossible to edit and splice one track without affecting the other, recordings

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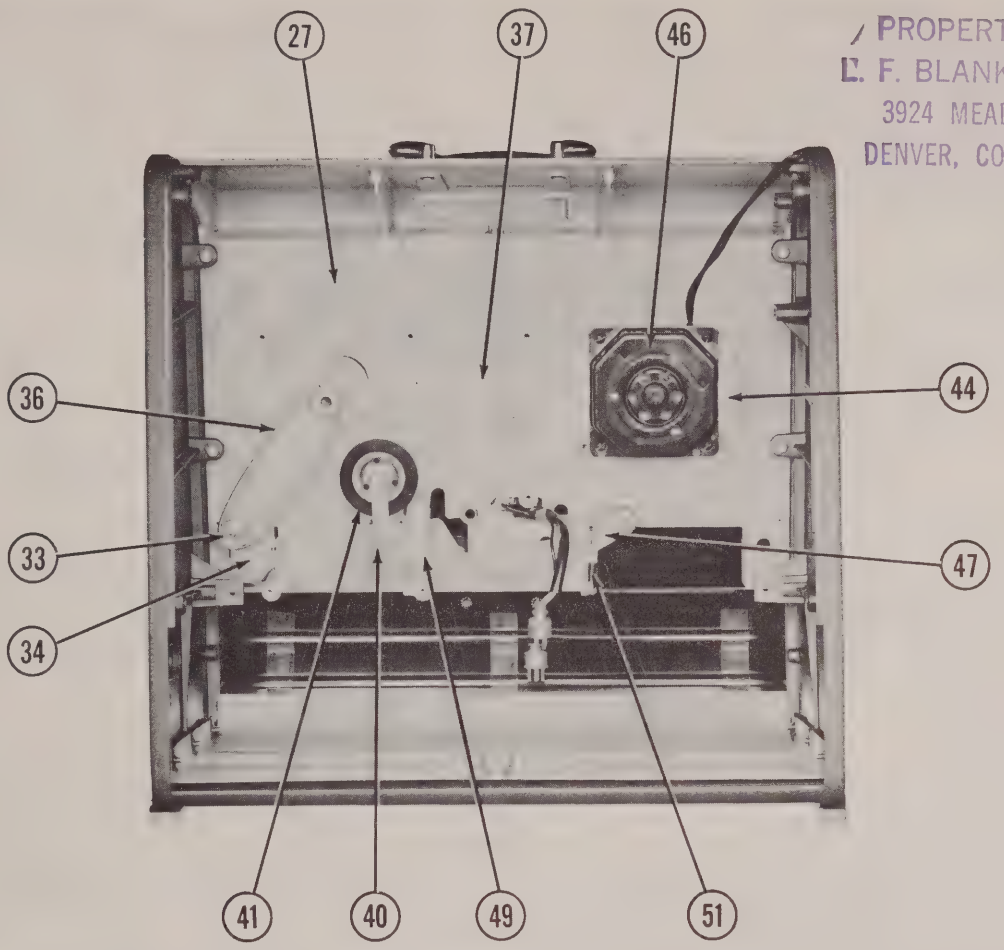

Figure 5

which are to be edited should be limited to one track only.

1. The tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements may be inserted between selections, etc. Unused sections of tape can be spliced together for re-use.

(a) Cut tape at 60^0 angle with an overlap so ends will line up. (Cutting tape at 60^0 angle will eliminate detection of splice on recording.)

(b) Align both ends of tape, with glossy side up.

(c) Cover aligned ends with splicing tape, evenly and securely.

(d) Trim off excess splicing tape. (Cut into the recording tape very slightly.) This eliminates possibility of a sticky splice.

To Use External Speaker-

Any size speaker of the permanent magnet type, having a 3.2 ohm voice coil, may be used by connecting the alligator clips of the radio-phono cord across the voice coil of the external speaker and then inserting the radio-phono cord plug (same type as speaker plug) into the "Speaker" jack.

Fast Forward And Fast Rewind-

High-speed forward or rewind can be obtained by pressing the desired button. These functions are used primarily in locating a desired portion of a recording in a few seconds. You may press the "Forward" or "Rewind" button while in "Play" or "Record" positions but you cannot switch to other functions until you have first pressed the "Stop" button.

IMPORTANT: When pressing the "Stop" button... hold it down until the reels come to a complete stop.

To Use Recorder As A Public Address System-

To operate the Stereotone as a public address unit, insert the microphone plug into the "Mic.-Radio-Phono" input and turn the power on. At the back of the amplifier move the "Tape Drive" switch (Figure 2) to "Off". Unlock and press the "Record" and "Speaker" buttons. While speaking into the microphone adjust the "Volume" and "Tone" controls to the desired level.

The public address program may be recorded by leaving the "Tape Drive" switch in the "On" position. Then, proceed with the program as described above.

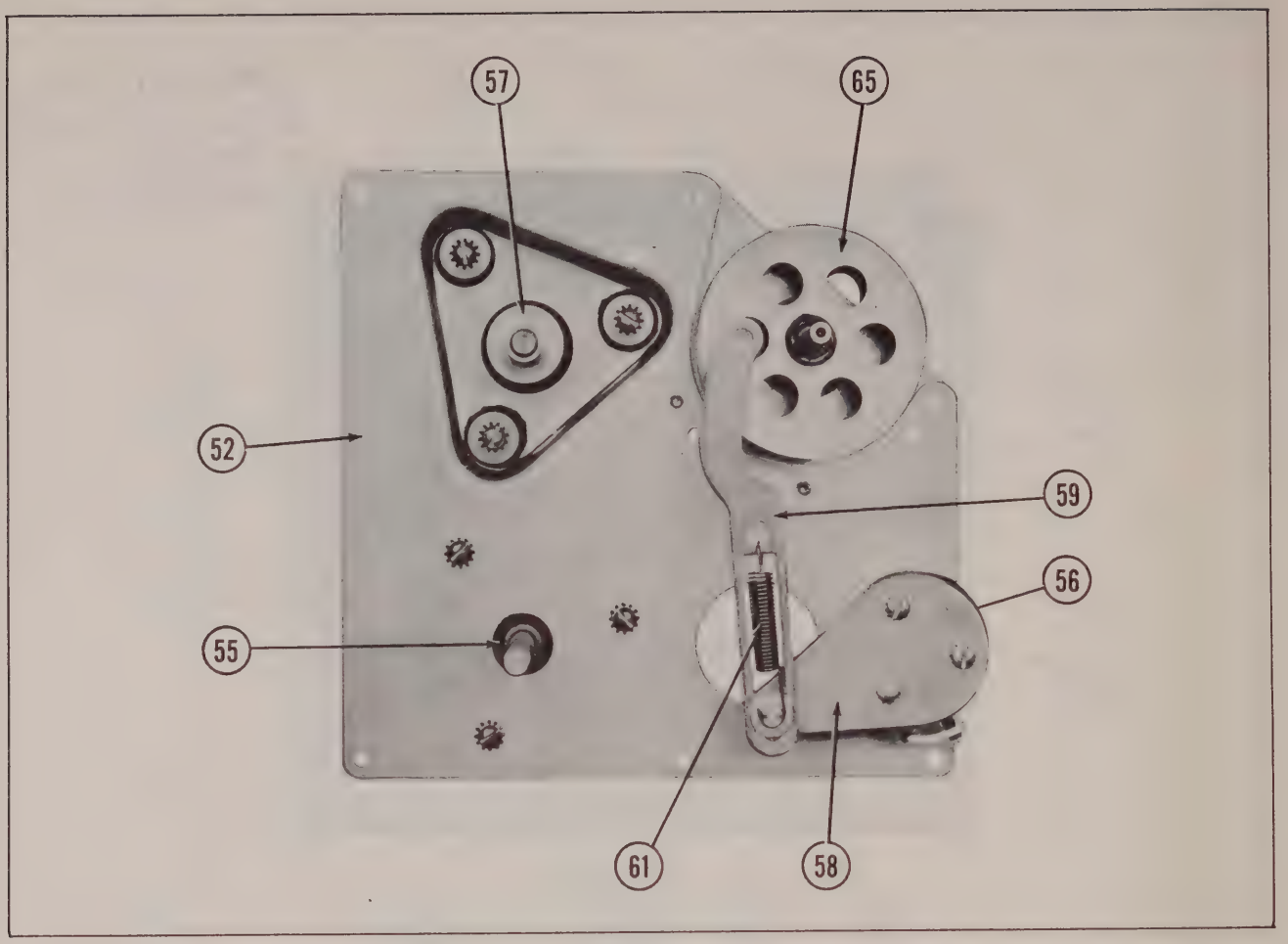

Figure 6

Program Indicator-

This odometer- type indicator registers "000" to "999" and will save much guesswork when trying to locate a desired portion of a pre-recorded tape. The reading of the indicator may be noted as the recording is being made so that reference to any given point on the tape may be made very rapidly. When a recorded tape has been so logged or referenced, always "zero" the indicator before starting to play the recording. This should be done before tape is threaded on the take-up reel. Press the "Forward" button and observe the indicator. Use the "Stop" button when approaching "000" and then the last few digits can be turned off manually by spinning the take-up reel with the fingers.

Speed Change-

This recorder operates at two speeds - 7 1/2 or 3 3/4 inches-per-second. The "Speed Change" knob will enable you to play or record tape at either speed. For 3 3/4" operation, take hold of the knob and turn it gently to the left, pull out, and release. To restore the setting to 7 1/2", take hold of the knob as before, turn it gently to the left, push in, and release.

ADJUSTMENTS

Play/Record Head Adjustment-

It is very important that play-record head (23) be lined up perfectly with the tape. If it is not, low output, loss of high frequencies or track overlap may result.

IMPORTANT: The heads have been aligned and locked in place at time of manufacture and should require no further adjustment, unless it becomes necessary to install a new head.

To adjust, make a tape recording of a 3000 cycle signal on a good unit. Place this on the unit that the head is to be aligned on. Connect an output meter or AC voltmeter across the speaker voice coil. Play the 3000 cycle tape, rock play-record head (23) back and forth, loosening two screws (20) will allow you to do this, and notice a variation in the output voltage at the voice coil. Tighten screws (23) in the position of highest output.

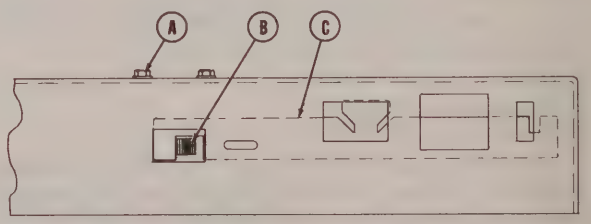

Figure 7

Memory Switch Adjustment-
(To Correct Imbalance In Braking)-

Remove amplifier chassis from case. Just above toggle on front of amplifier are two nuts (A) (See Fig. 7). Loosen these two nuts. Press the "Rewind" button to the bottom. Pull toggle of (B) to extreme right on switch assembly. Position entire switch assembly with left side of toggle just touching the latch bar (C) as shown in Fig. 7, then tighten the two nuts (A).

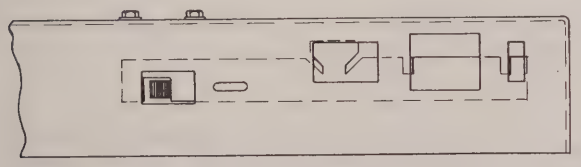

Figure 8

To check the adjustment, press the "Forward" button and observe new position of the toggle. It should then be in the extreme left position with the latch bar just touching the right side of the toggle as shown in Fig. 8.

LUBRICATION

The Stereotone has been lubricated at time of manufacture and this should be sufficient for the life of the recorder. In cases of extreme use or if parts are replaced, spread a thin film of Lubriplate on the pivot points of levers. Parts such as pressure roller (9), idler wheel (41), and flywheel assembly (65) are provided with generous-size oilite bearings and require no further attention.

CAUTION: Do not oil the motor bearings unless absolutely necessary as excess oil will only be thrown off and get on the pulleys and rollers. Always use as little oil as possible. If any oil should get on the pulleys or rollers wipe off with a petroleum solvent, such as alcohol.

CLEANING

The erase head, play/record head, capstan, and pressure roller are subject to an accumulation of tape coating oxide which is worn off the tape as it passes these parts. If left unattended the playing and recording qualities of the recorder will be affected. Periodically clean these surfaces with a soft cloth and alcohol.

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TROUBLE CHART

SYMPTOM	CAUSE	REMEDY
Broken reel spring (6).	Defective spring (6).	Replace spring. Turn spindle (4 or 5) until spring is on top of spindle. Put speaker panel in upright position. With long end of #8 allen wrench reach over spindle motor, locate and engage head of allen set screw (7) in top of hub between motor and front panel. Give allen wrench one-half turn to left to loosen screw and pull out broken spring from front of panel. Insert new spring and tighten set screw. NOTE: When placing new spring in position - push all the way in, then back out about 1/32" before tightening allen set screw.
Tape reel rubs on front panel.	Spindle hub (4 or 5) out of alignment.	(a) Remove reel spring (6), as above. (b) Turn spindle until reel spring slot is under spindle. With #8 allen wrench reach over spindle motor, locate and engage head of allen set screw in hub between motor and front panel. Give allen wrench one-half turn to left to loosen screw. (c) Slide hub slightly outward on spindle away from front panel and tighten set screw. Put empty reel on spindle and check for clearance between reel and panel and also for alignment of reel hub with tape feed from capstan. (d) Install reel spring (see "Replace Spring" above).
Take-up or Rewind sluggish or inoperable.	IMPORTANT: Tape is an elastic medium of recording. Stretching this tape will introduce "wow" and "flutter" (distortion) far in excess of the design specifications to which the Stereotone is manufactured. Fast tape transport in both directions is a highly desirable feature but must not be achieved at the sacrifice of fidelity of the recorded tape. For this reason the "take-off" must be a gentle action with positive control of the transport function - particularly at the ends of the tape. NOTE: A full 7" reel of 1200 feet of tape can be transported in either direction in about 40 seconds.	

TROUBLE CHART - Con't.

SYMPTOM	CAUSE	REMEDY
		Due to the gentle take-off action a slight manual assistance may be necessary to start the reels. By this means positive control is maintained and the tape may be repositioned at any point with great accuracy and with no loss of overall fidelity.
Takeup or Rewind sluggish (continued).	1. Low supply voltage.	1. Check line voltage. Should be between 105 and 125 volts AC.
	2. Drive belt (36) between take-up motor and PROGRAM INDICATOR odometer pulleys is too tight.	2. Stretch drive belt (36) slightly.
	3. Defective odometer.	3. Remove drive belt (36) from odometer pulley (33) and turn pulley with fingers through several revolutions. If pulley does not turn freely at any point of revolution replace odometer.
	4. Spindle motor bearing out of alignment due to rough handling during shipment.	4. Tap end of spindle sharply with wooden or plastic handle of screwdriver.
Tape Speed erratic.	1. Capstan drive slipping due to oil or dirt on drive surfaces.	1. Clean drive surface using a small lintless, soft cloth (cheesecloth or equivalent) dipped lightly in carbon tetrachloride, alcohol, or lighter fluid. With drive running, hold cloth against motor drive wheel (57), idler wheel (41), and capstan flywheel (65).
	2. Tape wound around capstan; oil or dirt on pressure roller.	2. Remove two screws in front of recording-head cover plate (1). If tape is wound around capstan peel or cut it off. CAUTION: Be extremely careful not to scratch or mar surface of capstan. Use soft cloth dipped in carbon tetrachloride, alcohol, or lighter fluid to clean surface of capstan and pressure roller. Use pipe-stem cleaner dipped lightly in one of above fluids to wipe off any tape dust from face of Brush "redheads". Replace cover plate and screws. NOTE: Do not turn screws in too tightly.
Rubber foot under recorder broken or missing.	Defective or damaged foot.	Replace by removing mounting screw and replacing foot.
Loose tension spring on speaker panel.	1. Spring disengaged from panel bracket.	1. Engage spring properly.
	2. Spring fatigued.	2. Replace with new spring. If on left side, remove bracket retaining screw, take off end of bracket, slide off spring and replace it. Put end of bracket in position and screw in place. If on right side, turn power off, loosen the two mounting screws securing the power transformer to the right side of the recorder case sufficiently to enable removing screw, end of bracket, and spring. Proceed as above to replace. Tighten transformer mounting screws securely.
Hum in playback.	1. Congested wiring.	1. Separate wires in back of recorder to make certain none comes against moving parts. Check that all plug-in connections are securely in place. Reverse the power-cord plug in wall socket.
	2. Recorded signal level too low.	2. Press "PLAY" button and set "VOLUME" for preferred listening level. Place "SPEED CHANGE" knob

SYMPTOM	CAUSE	REMEDY
		in "NEUTRAL" (between the 3 3/4 and 7 1/2 ips). Hum should disappear indicating too low an input signal level was used for recording. Set proper input level when recording. NOTE: It should never be necessary to raise the "VOLUME" control setting above "3" or "4" when recording. If hum persists observe the following:
	3. AC hum pickup from power equipment (transformers), fluorescent fixtures, etc.	3. Avoid operating the recorder in the proximity of such devices and/or provide a good electrical ground for the amplifier chassis.
	4. Hum pickup from associated signal equipment.	4. (a) Switch input connections. (b) Provide a common metallic bond between all associated equipment and ground system securely. (c) If signal output voltage of associated equipment is characteristically low use shielded lead between signal source and Stereotone input.
	5. Defective vacuum tube.	5. Check and replace faulty tube.
Does not erase properly.	Pressure pad worn.	Remove recording-head cover plate (1) and examine felt pads on pressure levers. Replace if worn. Peel off old pads and mount new ones (from envelope stapled in Instruction book) using DuPont clear cement or equivalent.
Does not record properly.	1. Faulty operating procedure.	1. Refer to "Operating Instructions". Also observe "REMEDY" column under "Hum In Playback" of this chart.
	2. Pressure pad worn.	2. Examine for worn pads and replace if necessary (see replacement directions above).
	3. Distorted recording.	3. Try recording with microphone supplied with the Stereotone. If clean recording can be made with "mike" check for mismatched impedance in hookup of associated equipment.

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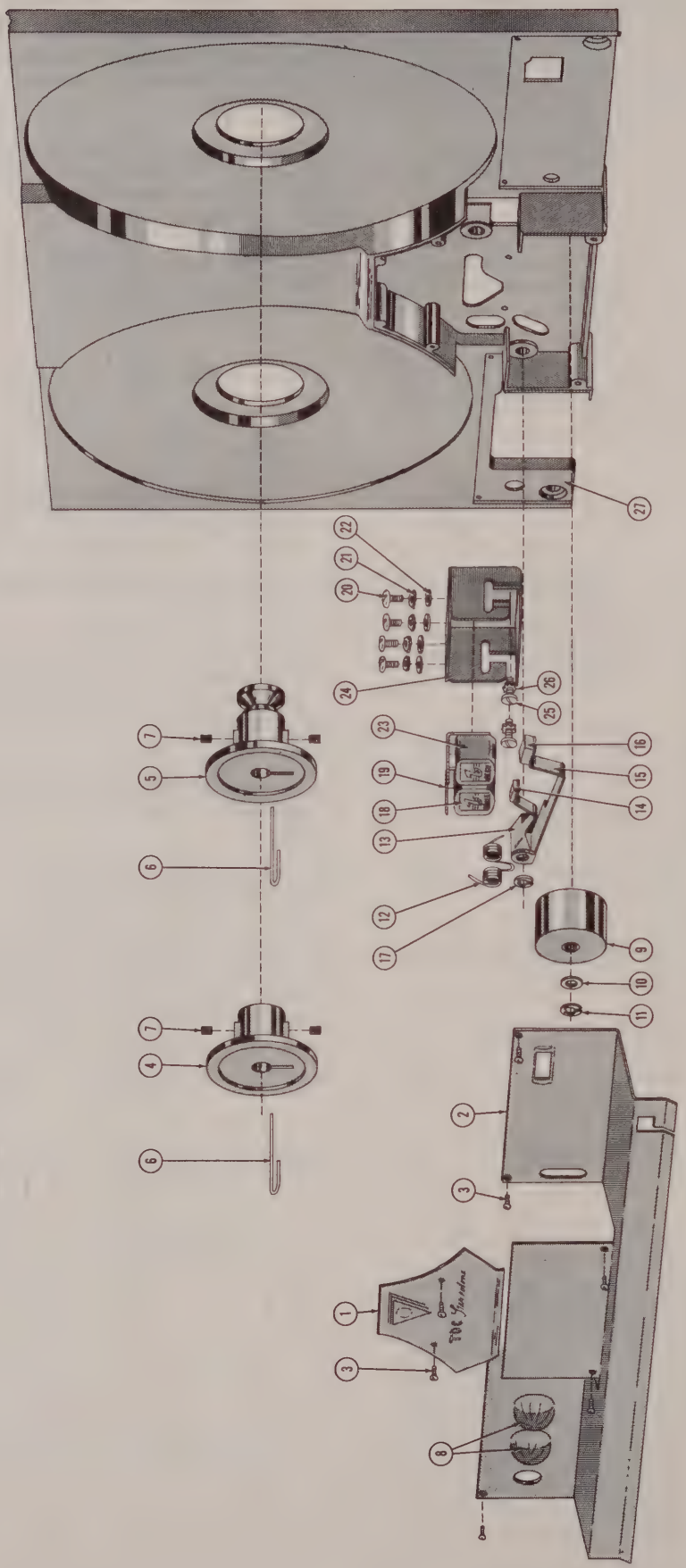

Figure 9A. Exploded View Of Parts In Front Of Baseplate.

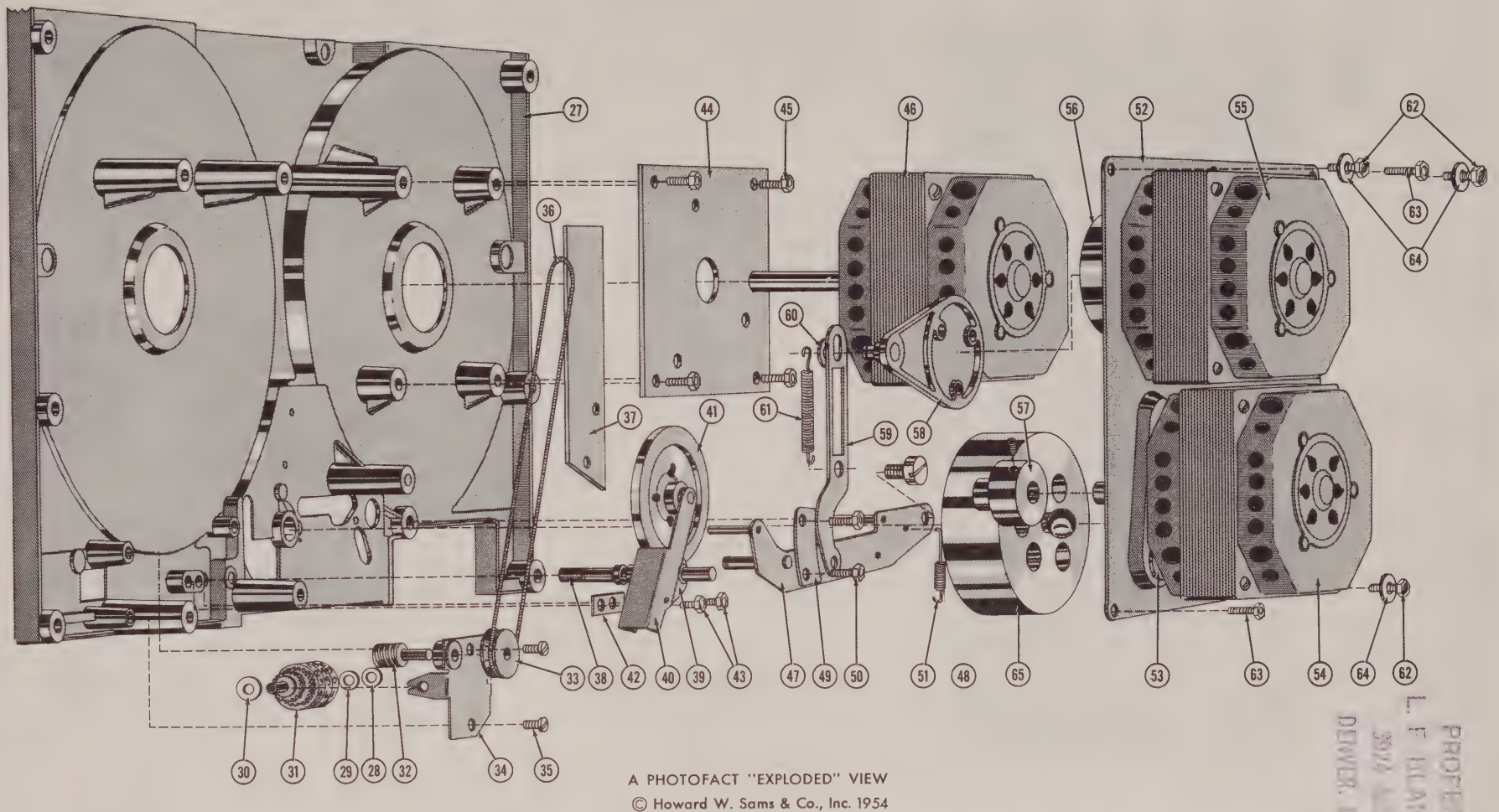

Figure 9B. Exploded View Of Parts At Rear Of Baseplate.

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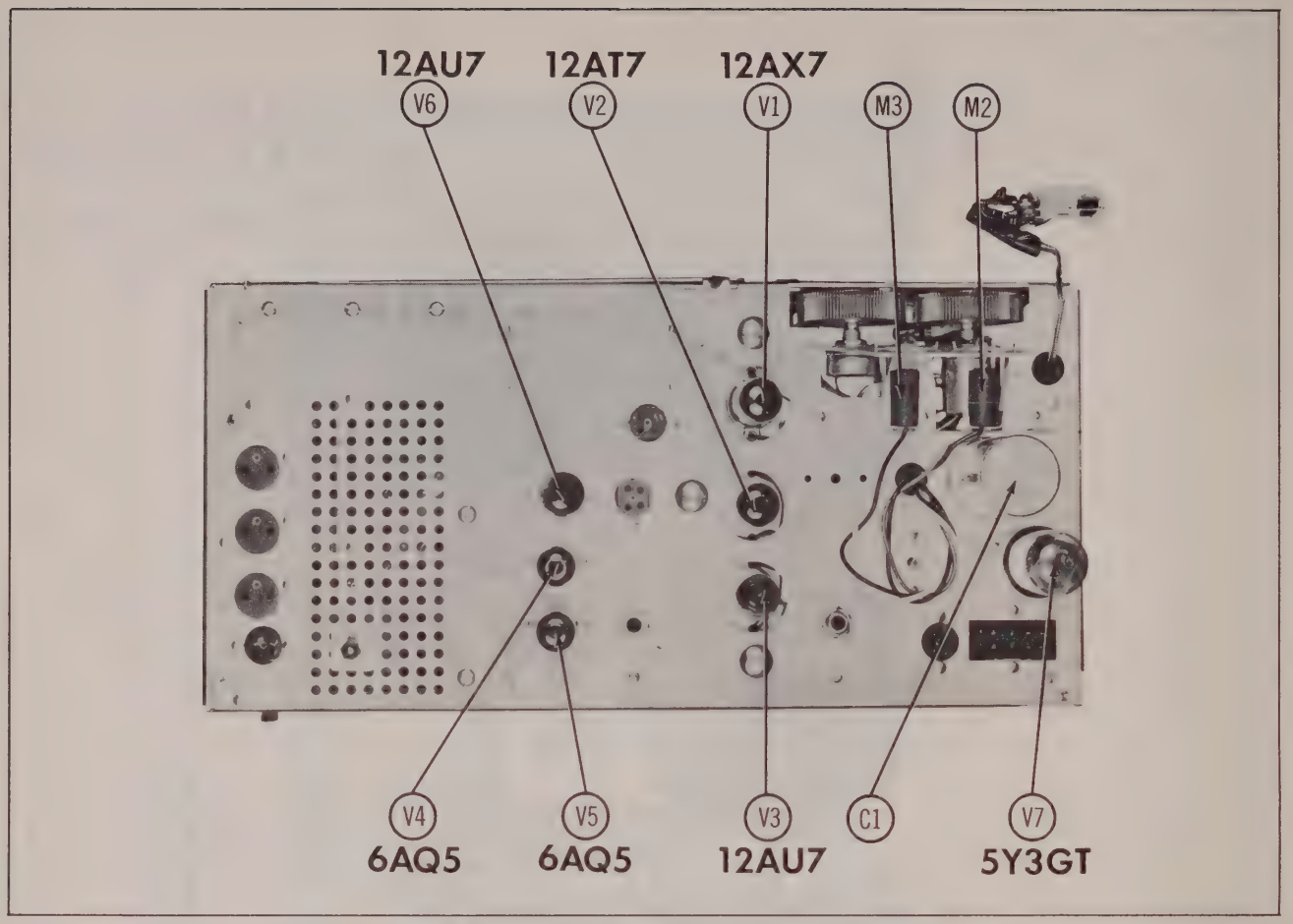
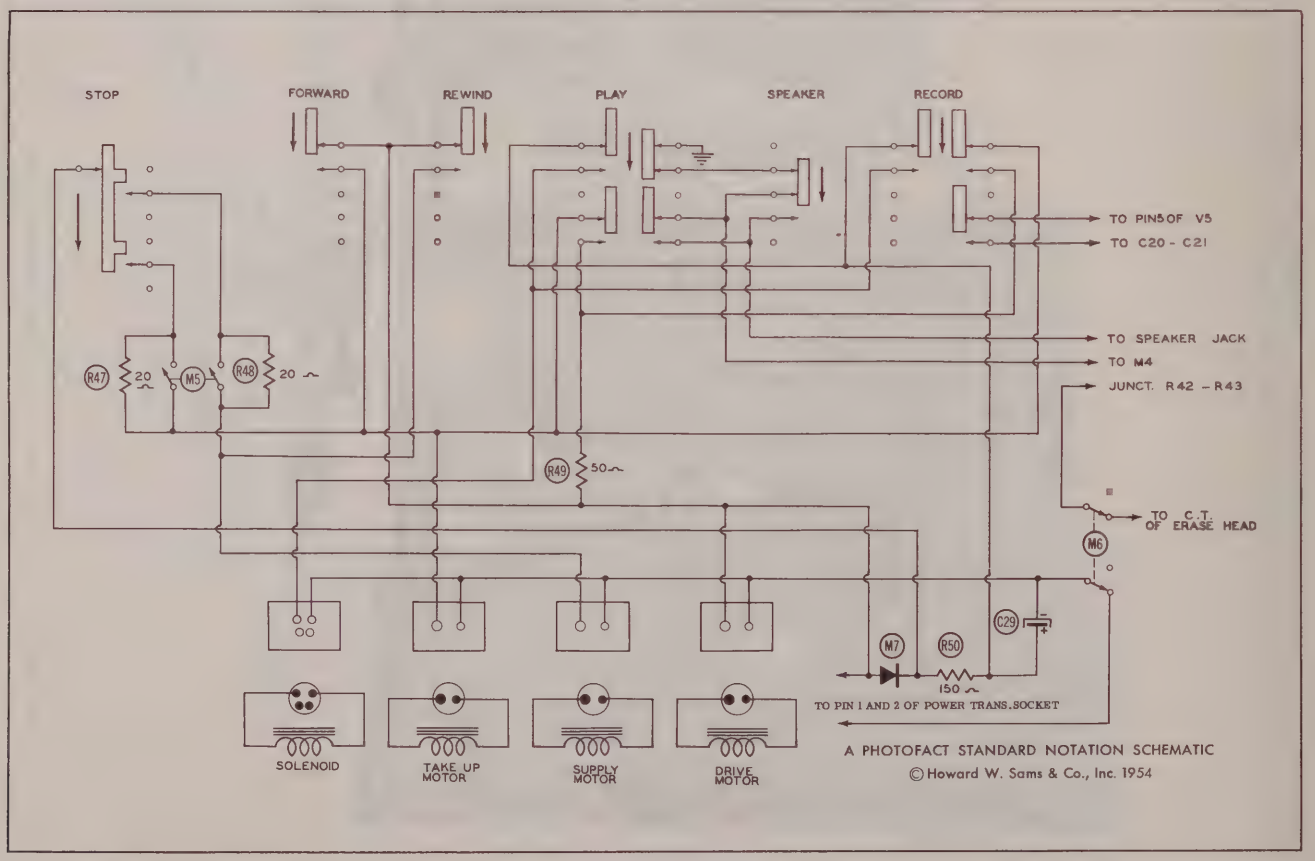
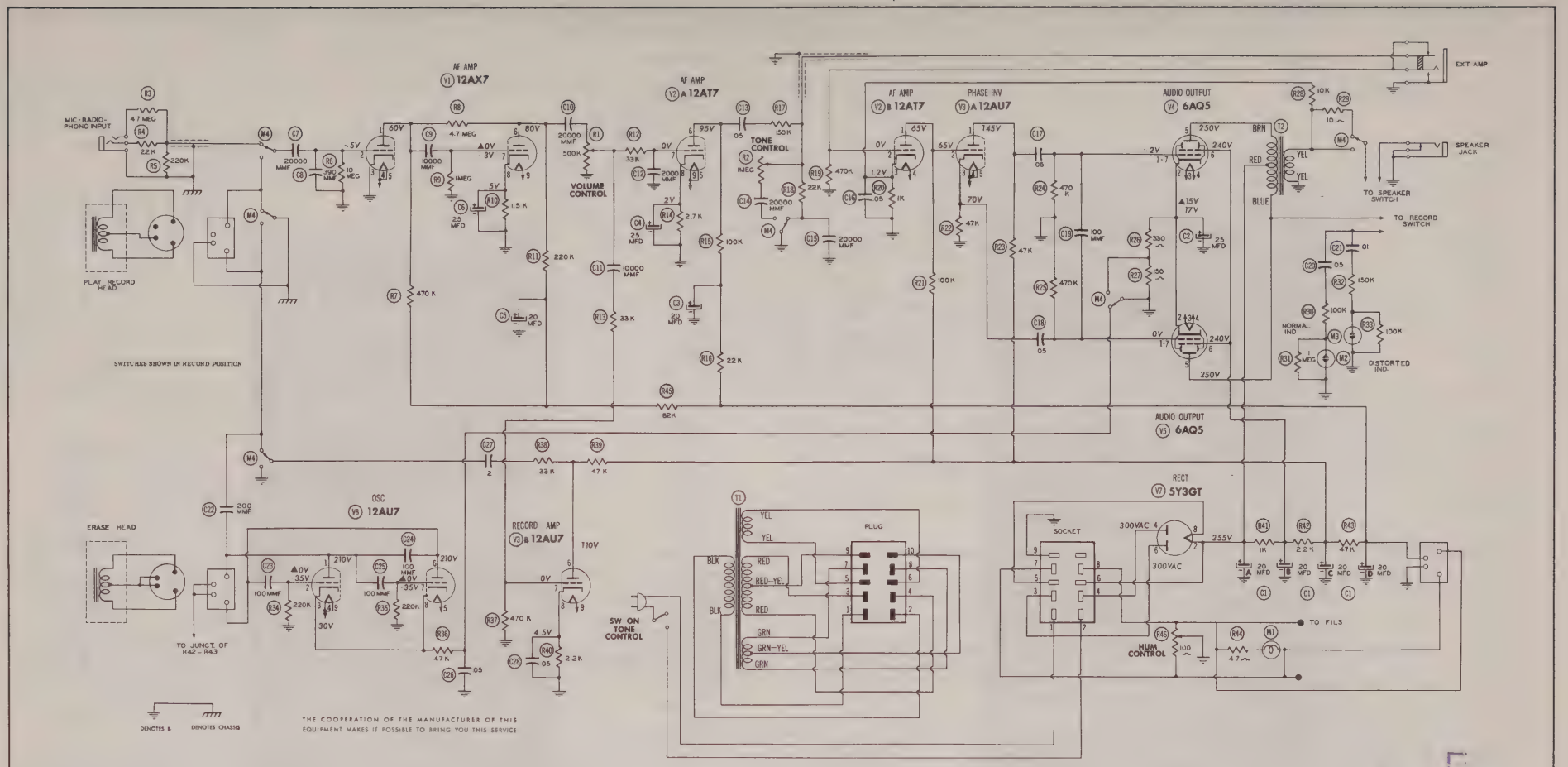


Figure 10



AC WIRING DIAGRAM



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†300KΩ	10Meg	0Ω	20Ω	20Ω	†300KΩ	1Meg	1.8KΩ	20Ω
V 2	12AT7	†100KΩ	±470KΩ 60KΩ	1KΩ	20Ω	20Ω	†120KΩ	300KΩ	2.7KΩ	20Ω
V 3	12AU7	†90KΩ	†300KΩ	47KΩ	20Ω	20Ω	†50KΩ	470KΩ	2.2KΩ	20Ω
V 4	6AQ5	470KΩ	±330Ω 680Ω	20Ω	20Ω	†200Ω	†1KΩ	470KΩ		
V 5	6AQ5	470KΩ	±330Ω 680Ω	20Ω	20Ω	†200Ω	†1KΩ	470KΩ		
V 6	12AU7	†2.5KΩ	330KΩ	±INF 4.7KΩ	20Ω	20Ω	†2.5KΩ	330KΩ	±INF 4.7KΩ	20Ω
V 7	5Y3GT	INF	180Ω	INF	180Ω	INF	600Ω	INF	180Ω	

* MEASURED IN "PLAY" POSITION
† MEASURED FROM PIN 2 OF V7
ALL MEASUREMENTS TAKEN IN "RECORD" POSITION UNLESS OTHERWISE DESIGNATED

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MODEL 130

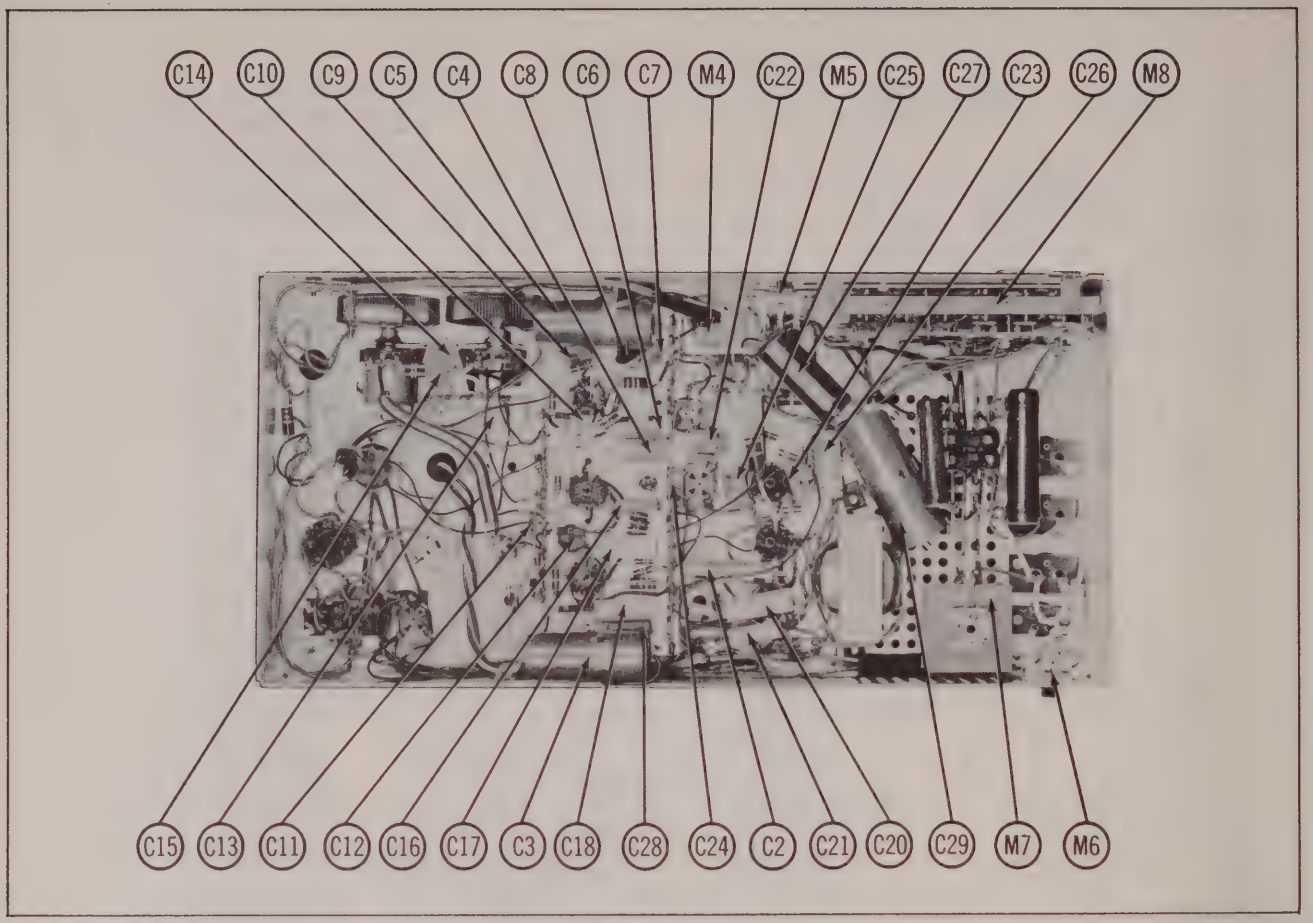

Figure 11

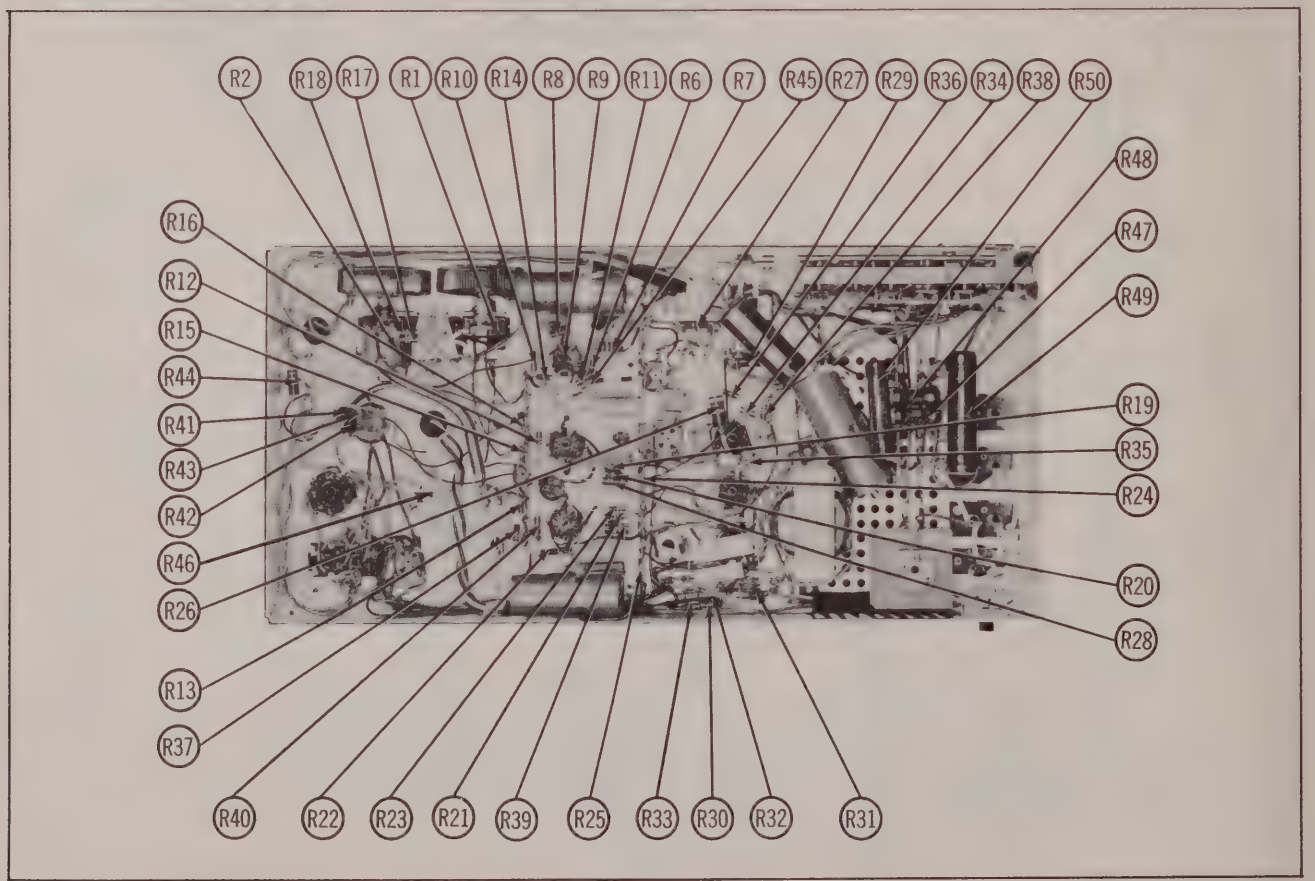

Figure 12

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ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1	93-1	12AX7, Pre-Amp.	R12	99-22	Resistor, 33KΩ, 1/2 W., 10%
V2	93-2	12AT7, AF Amp.	R13	99-22	Resistor, 33KΩ, 1/2 W., 10%
V3	93-3	12AU7, Phase Inv. & Record Amp.	R14	99-9	Resistor, 2.7KΩ, 1/2 W., 10%
V4	93-4	6AQ5, Audio Output	R15	99-8	Resistor, 100KΩ, 1/2 W., 10%
V5	93-4	6AQ5, Audio Output	R16	99-2	Resistor, 22KΩ, 1/2 W., 10%
V6	93-3	12AU7, Oscillator	R17	99-16	Resistor, 150KΩ, 1/2 W., 10%
V7	93-5	5Y3GT, Rectifier	R18	99-2	Resistor, 22KΩ, 1/2 W., 10%
C1A	98-10	Elect. Cap., 20mfd. @450V.	R19	99-17	Resistor, 470KΩ, 1/2 W., 10%
C1B		Elect. Cap., 20mfd. @450V.	R20	99-44	Resistor, 1KΩ, 1/2 W., 10%
C1C		Elect. Cap., 20mfd. @450V.	R21	99-8	Resistor, 100KΩ, 1/2 W., 10%
C1D		Elect. Cap., 20mfd. @450V.	R22	99-20	Resistor, 47KΩ, 1/2 W., 10%
C2	98-21	Elect. Cap., 25mfd. @50V.	R23	99-20	Resistor, 47KΩ, 1/2 W., 10%
C3	98-19	Elect. Cap., 20mfd. @350V.	R24	99-17	Resistor, 470KΩ, 1/2 W., 10%
C4	98-18	Elect. Cap., 25mfd. @6V.	R25	99-17	Resistor, 470KΩ, 1/2 W., 10%
C5	98-26	Elect. Cap., 20mfd. @350V.	R26	99-40	Resistor, 330Ω, 2 W., 10%
C6	98-18	Elect. Cap., 25mfd. @6V.	R27	99-19	Resistor, 150Ω, 1 W., 10%
C7	98-7	Ceramic Cap., 20,000mmf., 10%	R28	99-14	Resistor, 10KΩ, 1/2 W., 10%
C8	98-17	Ceramic Cap., 390mmf., 10%	R29	99-21	Resistor, 10Ω, 2 W., 10%
C9	98-15	Ceramic Cap., 10,000mmf., 10%	R30	99-8	Resistor, 100KΩ, 1/2 W., 10%
C10	98-7	Ceramic Cap., 20,000mmf., 10%	R31	99-10	Resistor, 1Meg, 1/2 W., 10%
C11	98-15	Ceramic Cap., 10,000mmf., 10%	R32	99-16	Resistor, 150KΩ, 1/2 W., 10%
C12	98-6	Ceramic Cap., 2000mmf., 10%	R33	99-8	Resistor, 100KΩ, 1/2 W., 10%
C13	98-8	Molded Paper, .05mfd. @400V., 10%	R34	99-1	Resistor, 220KΩ, 1/2 W., 10%
C14	98-7	Ceramic Cap., 20,000mmf., 10%	R35	99-1	Resistor, 220KΩ, 1/2 W., 10%
C15	98-7	Ceramic Cap., 20,000mmf., 10%	R36	99-41	Resistor, 4.7KΩ, 1/2 W., 10%
C16	98-20	Paper Cap., .05mfd. @150V.	R37	99-17	Resistor, 470KΩ, 1/2 W., 10%
C17	98-8	Molded Paper, .05mfd. @400V., 10%	R38	99-22	Resistor, 33KΩ, 1/2 W., 10%
C18	98-8	Molded Paper, .05mfd. @400V., 10%	R39	99-55	Resistor, 47KΩ, 1/2 W., 10%
C19	98-12	Ceramic Cap., 100mmf., 10%	R40	99-56	Resistor, 2.2KΩ, 1/2 W., 10%
C20	98-8	Molded Paper, .05mfd. @400V., 10%	R41	99-43	Resistor, 1KΩ, 2 W., 10%
C21	99-22	Molded Paper, .01mfd. @400V., 10%	R42	99-42	Resistor, 2.2KΩ, 2 W., 10%
C22	98-24	Mica Cap., 200mmf., 10%	R43	99-33	Resistor, 4.7KΩ, 1 W., 10%
C23	98-12	Mica Cap., 100mmf., 10%	R44	99-29	Resistor, 4.7Ω, 1 W., 10%
C24	98-12	Mica Cap., 100mmf., 10%	R45	99-11	Resistor, 82KΩ, 1/2 W., 10%
C25	98-12	Mica Cap., 100mmf., 10%	R46	99-15	Hum Balance Cont. 100Ω
C26	98-8	Molded Paper, .05mfd. @400V., 10%	R47	99-37	Resistor, 20Ω, 5 W., W.W.
C27	98-23	Paper Tub., .2mfd. @600V.	R48	99-37	Resistor, 20Ω, 5 W., W.W.
C28	98-20	Paper Cap., .05mfd. @150V.	R49	99-57	Resistor, 50Ω, 30 W., W.W.
C29	98-14	Elect. Cap., 40mfd. @350V.	R50	99-5	Resistor, 150Ω, 20 W., W.W.
R1	99-35	Volume Cont., 500KΩ	T1	130-3	Power Transformer
R2	99-36	Tone Cont. & Switch, 1 Meg.	T2	130-4	Output Transformer
R3	99-3	Resistor, 4.7Meg., 1/2 W., 10%	M1	87-62	Pilot Lamp, Type TS47
R4	99-2	Resistor, 22KΩ, 1/2 W., 10%	M2	87-61	Neon Lamp, Type NE51, Normal Ind.
R5	99-1	Resistor, 220KΩ, 1/2 W., 10%	M3	87-61	Neon Lamp, Type NE51, Distorted Ind.
R6	99-6	Resistor, 10Meg., 1/2 W., 10%	M4	86-18	Play-Record Slide Switch
R7	99-7	Resistor, 470KΩ, 1 W., 10%	M5	86-19	Memory Switch
R8	99-3	Resistor, 4.7Meg., 1/2 W., 10%	M6	86-20	Tape Drive Switch
R9	99-10	Resistor, 1Meg., 1/2 W., 10%	M7	130-6	Selenium Rectifier
R10	99-39	Resistor, 1.5KΩ, 1/2 W., 10%	M8	86-21	Push Button Switch
R11	99-1	Resistor, 220KΩ, 1/2 W., 10%			

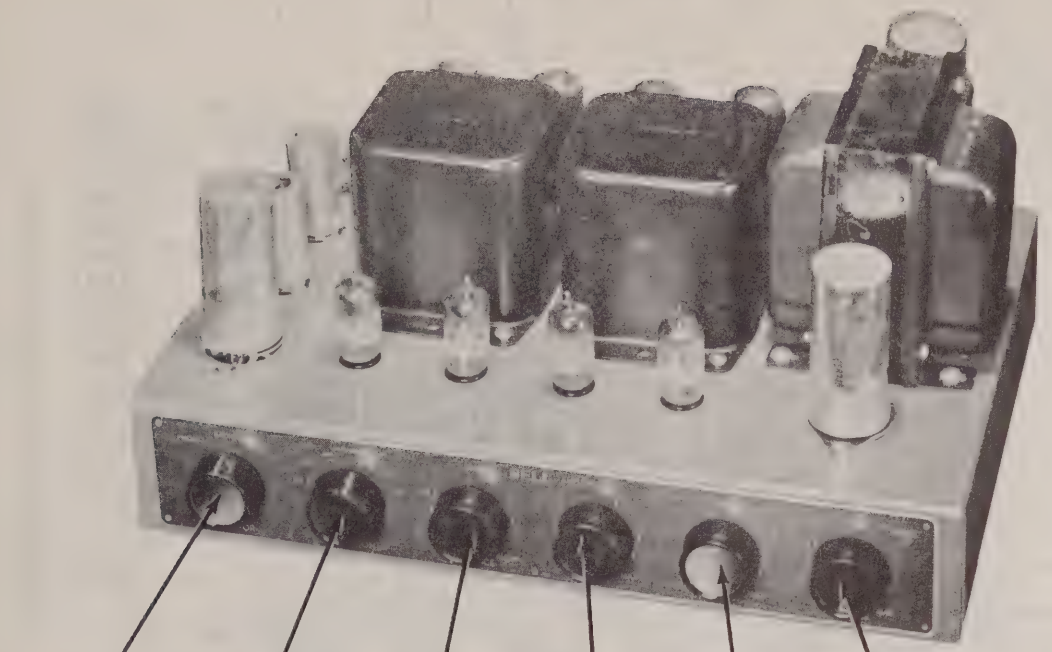
MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	130-346	Nameplate -Record Head Cover	11	82-7	E - Ring
2	130-344	Nameplate - Main	12	130-209	Spring - Double Torsion
3	11-13	Screw, Rd. Hd. Thd. Cut. #2-56 x 3/16	13	130-246	Erase Arm
4	130-229	Disc-Rewind Spindle	14	130-330	Erase Head Pad
5	130-243	Disc-Take Up Spindle	15	130-247	Record And Play Arm
6	130-271	Spring - Reel	16	130-273	Record Head Pad
7	41-2	Screw - Set #8-32 x 1/4	17	82-7	E - Ring
8	130-308	Cap Plastic Neon	18	130-2	Erase Head
9	130-264	Roller - Pressure	19	130-282	Head Bracket
10	130-207	Washer - Pressure Roller	20	3-2	Screw - Bd. Hd. #5-40 x 3/16

MECHANICAL PARTS LIST - Con't.

Ref. No.	Part No.	Description
21	63-1	Washer - #5 Ext. Tooth
22	61-34	Washer. - 9/64 x 1/4 x .031
23	130-1	Record - Play Head
24	130-202	Tape Guide
25	63-4	Washer - #6 Ext. Tooth
26	3-4	Screw - Bd. Hd. #6-32 x 1/4
27	130-M-235	Mech Housing
28	67-9	Spring Washer
29	61-26	Washer - .196 x 5/16 x 1/32
30	61-70	Washer - .224 x 7/16 x .030
31	130-S-11	Counter Assembly
32	130-S-10	Counter Worm Assembly
33	130-252	Counter Pulley
34	130-S-43	Counter Frame & Bearing Assy.
35	13-1	Screw - Bd. Hd. 6-32 x 1/4
36	130-355	Counter Belt
37	130-323	Hum Shield
38	130-212	Speed Changer Shaft
39	130-278	Idler Crank
40	130-211	Idler Link
41	130-263	Idler Wheel
42	130-206	Speed Changer Shaft Stop
43	18-22	Screw - Hex Hd. Self T. #6-32 x 5/16
44	130-285	Rewind Motor Mounting Plate
45	18-23	Screw - Hex Hd. Self T. #8-32 x 5/16
46	90-38	Rewind Motor
47	130-201	Pressure Roller Plate
48	130-205	Pivot Roller Arm Screw
49	130-296	Roller Plate Guide
50	18-22	Screw - Hex Hd. Self T. #6-32 x 5/16
51	130-314	Roller Plate Spring
52	130-210	Motor Mtg. Drive Plate
53	89-10	Shock Mount (Lord)
54	90-27	Drive Motor
55	90-29	Take Up Motor
56	130-S-35	Solenoid & Plug Assembly
57	130-231	Drive Motor Pulley
58	130-S-46	Solenoid Arm & Pin Assembly
59	130-240	Solenoid Link
60	61-9	Washer - Plain .265 x 1/2 x .030
61	130-266	Solenoid Link Spring
62	18-25	Screw - Hex Hd. #8-32 x 1/2
63	18-23	Screw - Hex Hd. Self T. #8-32 x 5/16
64	61-39	Washer - Plain 3/16 x 7/16 x 1/32
65	130-S-14	Flywheel Assembly

BELL SOUND
MODEL 3D



BELL SOUND
MODEL 3D

TRADE NAME	Bell Sound Model 3D
MANUFACTURER	Bell Sound Systems, Inc., 555 Marion Rd., Columbus, Ohio
TYPE SET	AC Operated Binaural Audio Amplifier With Equalization and Pre-Amplifier
TUBES	Eleven
POWER SUPPLY	110-120 Volts AC-50/60 Cycles RATING 1.15 Amp. @ 117Volts AC

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		BELL SOUND PART No.	STANDARD REPLACEMENT		
V1	AF Amplifier	12AY7	12AY7	9A	
V2	AF Amplifier	12AT7	12AT7	9A	
V3	AF Amplifier-Phase Inverter	12AX7	12AX7	9A	
V4	Audio Output	6V6GT	6V6GT	7S	
V5	Audio Output	6V6GT	6V6GT	7S	
V6	AF Amplifier	12AY7	12AY7	9A	
V7	AF Amplifier	12AT7	12AT7	9A	
V8	AF Amplifier-Phase Inverter	12AX7	12AX7	9A	
V9	Audio Output	6V6GT	6V6GT	7S	
V10	Audio Output	6V6GT	6V6GT	7S	
V11	Rectifier	5U4G	5U4G	5T	

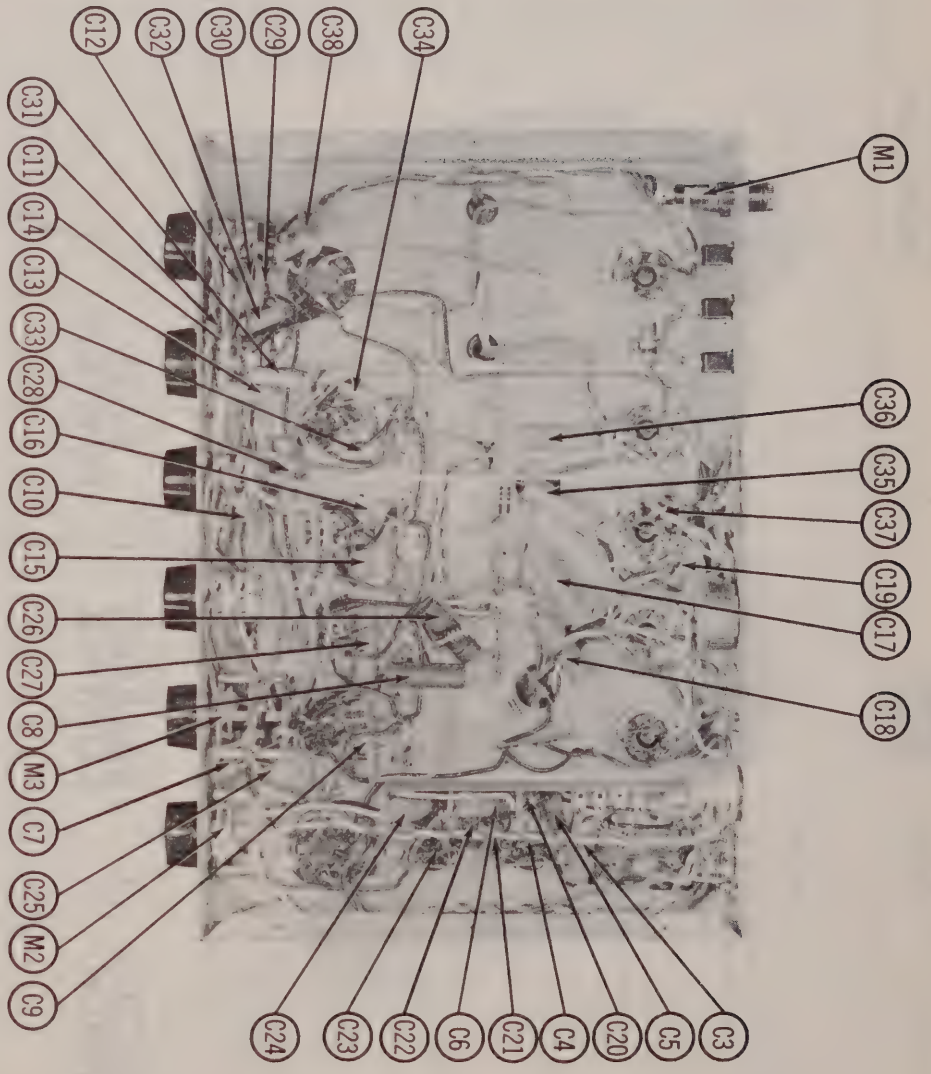
CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	BELL SOUND PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	● 40	450		AFH3-44		C110		FP377	TVL-3787	
B	■ 40	450								
C	▲ 40	50								
C2A	● 20	450		AFH4-14		D013		FP444	TVL-4763	
B	■ 20	450		AFH4-14		D013		FP444	TVL-4763	
C	▲ 20	450								
D	20	450								
C3	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C4	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C5	.006	400								
C6	.05	600		P688-05	DF-503	CUB6S5		PT615	6TM-S5	
C7	.002	400		P688-002	D6-202	CUB6D2	GP2L-202	PT622	6TM-D2	Note 1
C8	.05	600		P688-05	DF-503	CUB6S5		PT615	6TM-S5	
C9	.05	600		P688-05	DF-503	CUB6S5		PT615	6TM-S5	
C10	.05	600		P688-05	DF-503	CUB6S5		PT615	6TM-S5	
C11	200	500		1469-0002		1W5T2		MC237	MS-32	
C12	.002	400								
C13	.01	400								
C14	.001	400								
C15	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C16	47	500		1469-00005		5W5Q47		MC225	MS-45	
C17	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C18	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C19	100	500		1469-0001		1W5T1		MC235	MS-31	
C20	.05	400		P488-05	DF-503	CUB6S5		PT415	4TM-S5	
C21	.001	400		P488-001	D6-102	CUB4D1	GP2L-102	PT421	4TM-D1	
C22	.006	400		P688-006	D6-602	CUB6D6	GP2-333-602	PT626	6TM-D6	
C23	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C24	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C25	.002	400		P688-002	D6-602	CUB6D2	GP2L-202	PT622	6TM-D2	Note 1
C26	.05	600		P688-05	DF-503	CUB6S5		PT615	6TM-S5	
C27	.05	600		P688-05	DF-503	CUB6S5		PT615	6TM-S5	
C28	.05	600		P688-05	DF-503	CUB6S5		PT615	6TM-S5	
C29	200	500		1469-0002		1W5T2		MC237	MS-32	
C30	.002	400		P688-002	D6-602	CUB6D2	GP2L-202	PT622	6TM-D2	
C31	.01	400								
C32	.001	400								
C33	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C34	47	500		1469-00005		5W5Q47		MC225	MS-45	
C35	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C36	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C37	100	500		1469-0001		1W5T1		MC235		
C38	.05	400		489ZX-05	DF-503	CUB4S5		PT415	4TM-S5	

Note 1. Some models use an .01MFD @ 600V in this application.

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Bell Sound PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	250KΩ	½	B20066P121				UF254L	Balance
B	500KΩ	½					UR55L	
R2A	250KΩ	½	B20066P122		DC-8-Z			Gain - tapped ⓐ 40KΩ
B	150KΩ	½						Gain - tapped ⓐ 35KΩ
R3A	2Meg	½	B20066P120	Q13-139	DC-36-S		UF-26A	Bass
B	2Meg	½		M13-139			UR-26A	
R4A	2Meg	½	B20066P119	Q13-139	DC-36-S		UF-26A	Treble
B	2Meg	½		M13-139			UR-26A	
C	Switch		Not Req.	76-1	SWA		US-26	Attach to R4B
R5A	250KΩ	½	B20066P123		DC-8-Z		UF-254A	Radio Input Adj.
B	250KΩ	½					UR-254A	
R6A	100Ω	2	B20066P115	W-100	A43-100	VK-121	R100L	Hum Balance - wire wound
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R6A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	BELL SOUND PART No.	IRC PART No.	
R7	27KΩ	½		BTS-27K	
R8	150KΩ	½		BTS-150K	
R9	47KΩ	½		BTS-47K	
R10	10KΩ	½		BTS-10K	
R11	10 Meg	½		BTS-10 Meg	
R12	27KΩ	½		BTS-27K	
R13	68KΩ 5%	½		BTS-68K 5%	
R14	10 Meg	½		BTS-10 Meg	
R15	15KΩ	½		BTS-15K	
R16	12KΩ	½		BTS-12K	
R17	1.2Meg	½		BTS-1.2Meg	
R18	62KΩ 5%	½		BTS-62K 5%	
R19	15KΩ	½		BTS-15K	
R20	1500Ω 5%	½		BTS-1500 5%	
R21	100KΩ	½		BTS-100K	
R22	360KΩ 5%	½		BTS-360K 5%	
R23	470KΩ	½		BTS-470K	
R24	1500Ω 5%	½		BTS-1500 5%	
R25	100KΩ	½		BTS-100K	
R26	47KΩ	½		BTS-47K	
R27	200KΩ 5%	½		BTS-200K 5%	
R28	20KΩ 5%	½		BTS-20K 5%	
R29	27KΩ	½		BTS-27K	
R30	2000Ω 5%	½		BTS-2000 5%	
R31	100KΩ	½		BTS-100K	
R32	1.2Meg	½		BTS-1.2Meg	
R33	3300Ω	½		BTS-3300	
R34	130KΩ 5%	½		BTS-130K 5%	
R35	130KΩ 5%	½		BTS-130K 5%	
R36	24KΩ	½		BTS-24K 5%	
R37	270KΩ	½		BTS-270K	
R38	270KΩ	½		BTS-270K	
R39	47KΩ	½		BTS-47K	
R40	47KΩ	1		BTA-47K	
R41	2700Ω	½		BTS-2700	

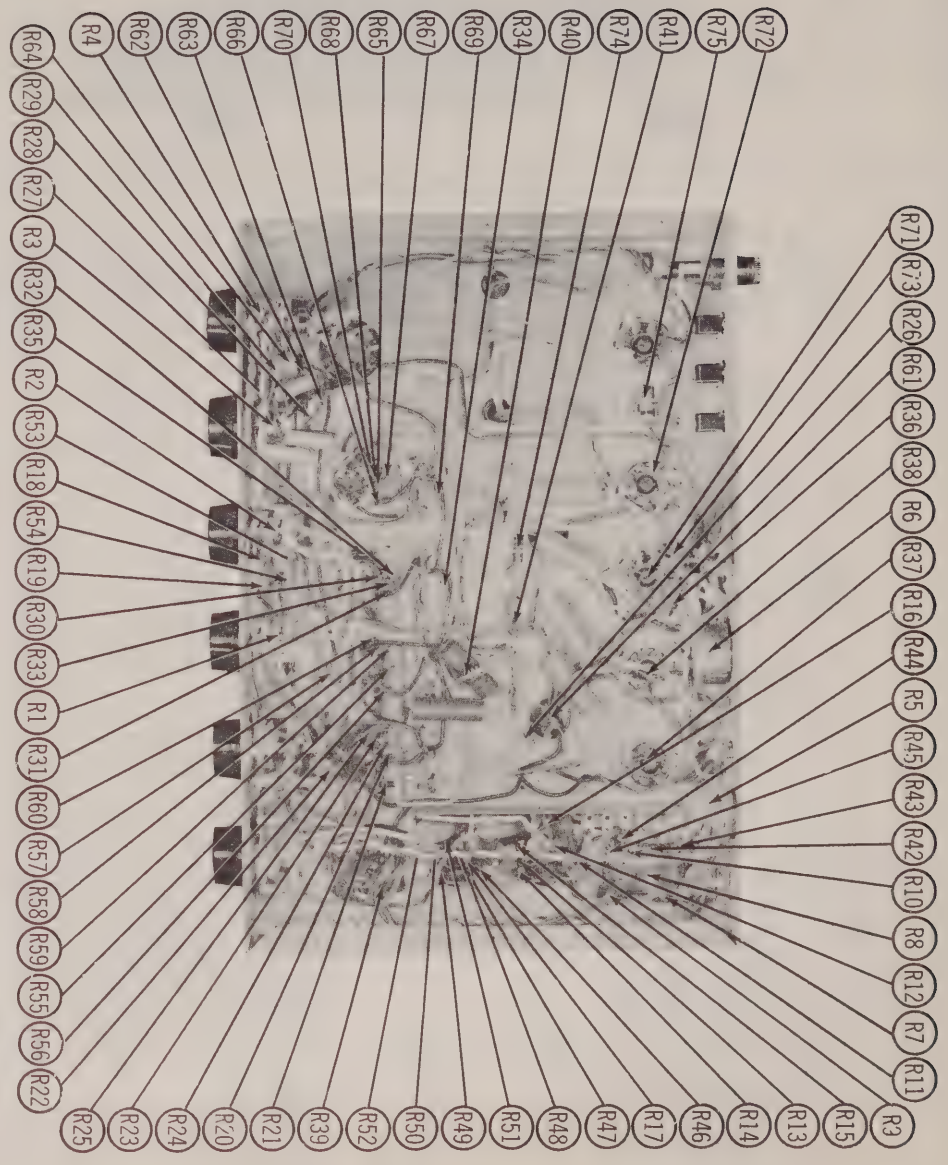
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	BELL SOUND PART No.	IRC PART No.	
R42	150KΩ	½		BTS-150K	
R43	27KΩ	½		BTS-27K	
R44	47KΩ	½		BTS-47K	
R45	10KΩ	½		BTS-10K	
R46	10 Meg	½		BTS-10 Meg	
V47	27KΩ	½		BTS-27K	
R48	68KΩ 5%	½		BTS-68K 5%	
R49	10 Meg	½		BTS-10 Meg	
R50	15KΩ	½		BTS-15K	
R51	12KΩ	½		BTS-12K	
R52	1.2Meg	½		BTS-1.2Meg	
R53	62KΩ 5%	½		BTS-62K 5%	
R54	15KΩ	½		BTS-15K	
R55	1500Ω 5%	½		BTS-1500 5%	
R51	100KΩ	½		BTS-100K	
R57	360KΩ 5%	½		BTS-360K 5%	
R58	470KΩ	½		BTS-470K	
R59	1500 5%	½		BTS-1500 5%	
R60	100KΩ	½		BTS-100K	
R61	47KΩ	½		BTS-47K	
R62	200KΩ 5%	½		BTS-200K 5%	
R63	20KΩ	½		BTS-20K	
R64	27KΩ	½		BTS-27K	
R65	2000Ω 5%	½		BTS-2000 5%	
R66	100KΩ	½		BTS-100K	
R67	1.2Meg	½		BTS-1.2Meg	
R68	3300Ω	½		BTS-3300	
R69	130KΩ 5%	½		BTS-130K 5%	
R70	130KΩ 5%	½		BTS-130K 5%	
R71	270KΩ	½		BTS-270K	
R72	270KΩ	½		BTS-270K	
R73	24KΩ 5%	½		BTS-24K 5%	
R74	1500Ω	1		BTA-1500	
R75	100KΩ	2		BTB-100K	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	Bell Sound PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC ⓐ1.15A	650VCT .170ADC	5VAC ⓐ3A	6.3VAC ⓐ3.3A	B-20260	P-5059 ①	P-3169 ①③	R-20A①②	P9318	

① Drill new mounting holes.
② Tape 6.3V center tap.
③ Tape 5V ⓐ 2A, 5V ⓐ 3A and 6.3V ⓐ 8A.

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Bell Sound PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	10KΩ CT	16Ω tap ⓐ 8Ω, 4Ω	B-20242	A-3311 ①	A-3132 ①	S-31A ①	H4103 ①	22S44 ①	① Drill new mounting hole.
T3	10KΩ CT	16Ω tap ⓐ 8Ω, 4Ω	B-20242	A-3311 ①	A-3132 ①	S-31A ①	H4103 ①	22S44 ①	

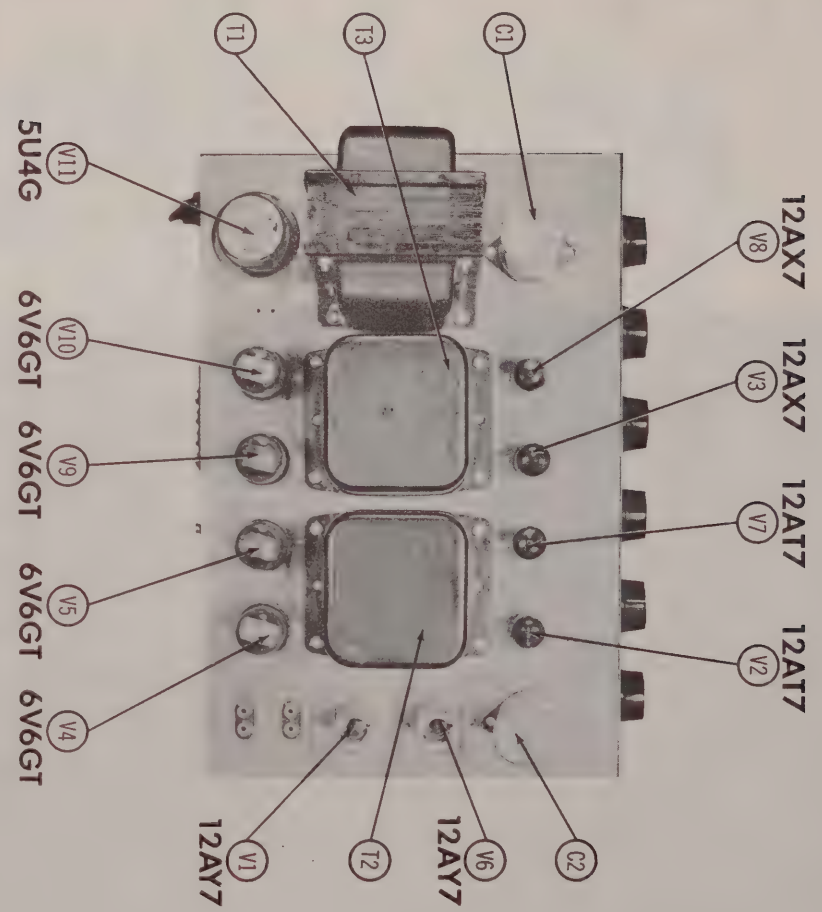
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Bell Sound PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	1.6A			31301.6 (3AG S/B-1.6A)	342001	MDL 1 6/10	HKP

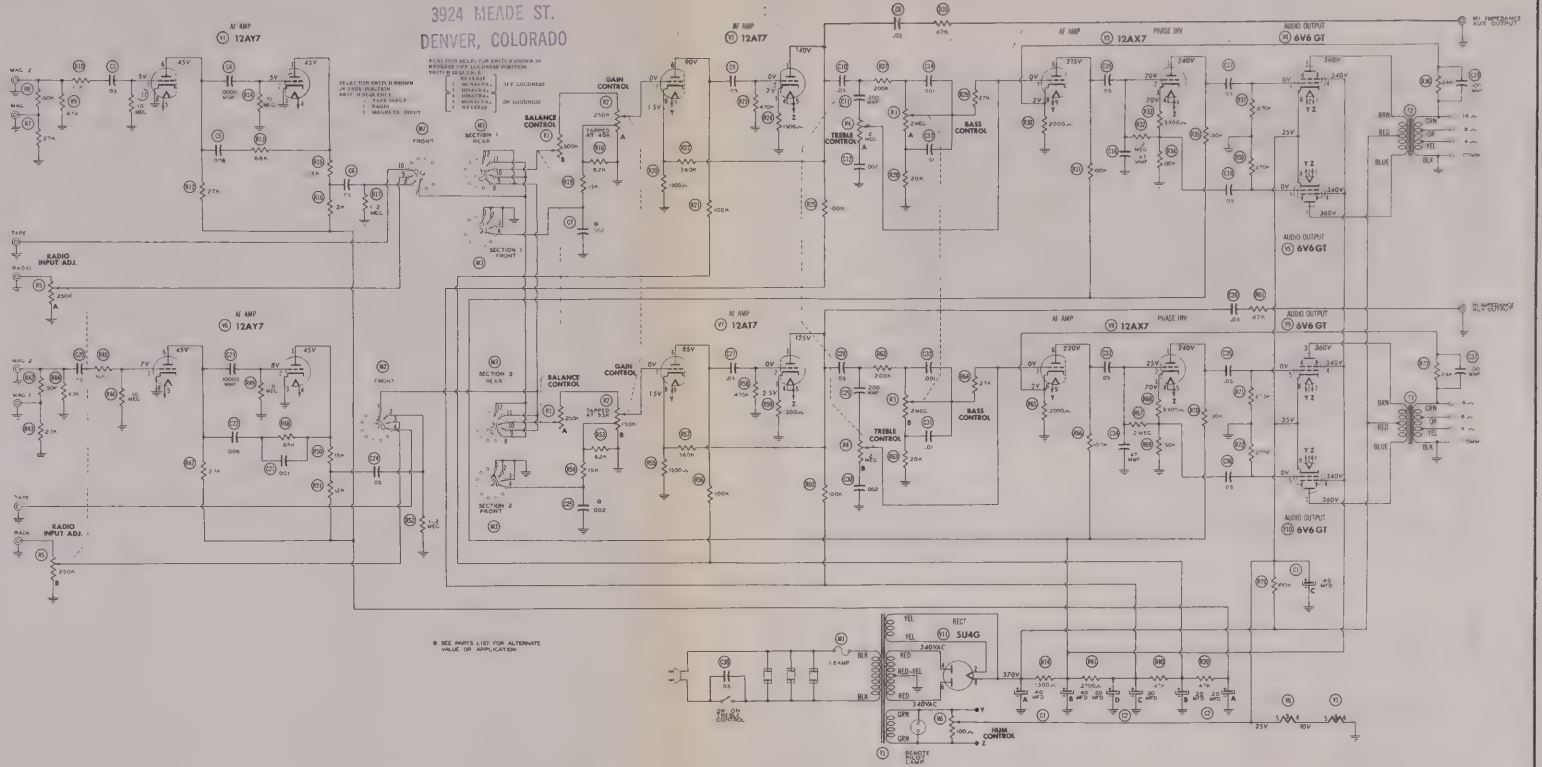
MISCELLANEOUS

ITEM No.	PART NAME	Bell Sound PART No.	NOTES
M2	Switch		Input Selector
M3	Switch		Function

CHASSIS—TOP VIEW



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



⊕ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1 DC voltage measurements taken with vacuum tube voltmeter
2 AC voltages measured at 1000 ohms per volt
3 Resistance measurements taken with ohmmeter
4 Measured values are from socket pin to chassis unless
5 Line voltage maintained at 117 volts for voltage readings.
6 Normal tolerance on components (other values may be) is variation of ± 10% in voltage and resistance readings
7 All controls in minimum, proper ranges have been connected.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SC7	0Ω	† 100KΩ	1 Meg	100KΩ	† 100KΩ	820Ω	.1Ω	.1Ω
V 2	6SN7	320KΩ	† 4KΩ	680Ω	320KΩ	† 4KΩ	680Ω	.1Ω	.1Ω
V 3	6L6G	0Ω	.1Ω	# 200Ω	† 430Ω	♦ 610Ω	♦ 340Ω	.1Ω	0Ω
V 4	6L6G	0Ω	.1Ω	# 200Ω	† 430Ω	♦ 610Ω	♦ 340Ω	.1Ω	0Ω
V 5	5U4G	INF.	0Ω	INF.	366Ω	INF.	366Ω	INF.	.1Ω
V 6	5V4G	INF.	25.5KΩ	INF.	110Ω	INF.	110Ω	INF.	25.5KΩ
V 7	5R4GY	INF.	25KΩ	INF.	55Ω	INF.	55Ω	INF.	25KΩ

♦ MEASURED FROM C4 NEGATIVE TERMINAL.
† MEASURED FROM PIN 8 OF V6.
# MEASURED FROM PIN 2 OF V7.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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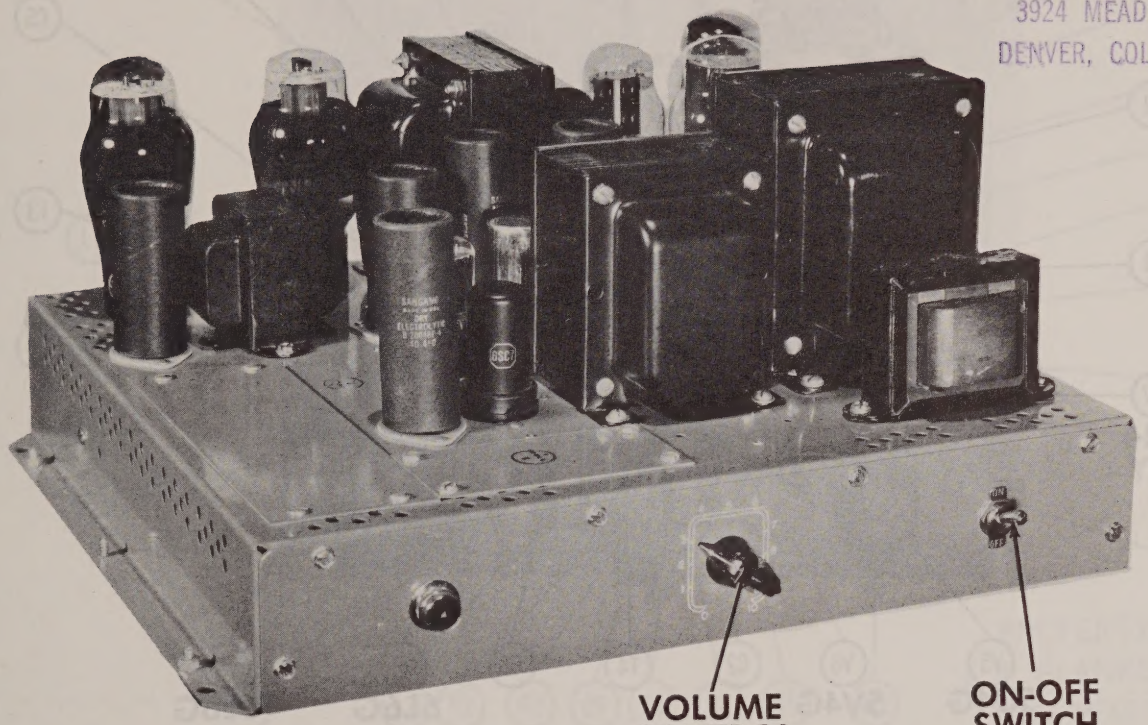
RETMA MEMBER

BELL SOUND
MODELS 2150, 2150R

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

BELL SOUND
MODELS 2150, 2150R



BELL SOUND
MODELS 2150, 2150R

TRADE NAME	Bell Sound Models 2150, 2150R
MANUFACTURER	Bell Sound Systems Inc., 555 Marion Rd., Columbus, Ohio
TYPE SET	AC Operated 50 Watt Booster Audio Amp.
TUBES (Seven)	Types 6SC7 AF Amp-Phase Inv., 6SN7 Driver, (2) 6L6G Audio Output, 5U4G Bias Rectifier, 5V4G Rectifier, 5R4G Rectifier
POWER SUPPLY	110-120 Volts AC-50/60 Cycles RATING 1.52 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

BELL SOUND
MODEL 2150

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		BELL SOUND PART No.	STANDARD REPLACEMENT		
V1	AF Amplifier-Phase Inverter	6SC7	6SC7	8S	
V2	Driver	6SN7	6SN7	8BD	
V3	Audio Output	6L6G	6L6G	7S	
V4	Audio Output	6L6G	6L6G	7S	
V5	Bias Rectifier	5U4G	5U4G	5T	
V6	Rectifier	5V4G	5V4G	5L	
V7	Rectifier	5R4GY	5R4GY	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	BELL SOUND PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	10	450		AFH2-47		B037		FP231	TVL-2750	
B	10	450								
C2	40	450		AHF1-52		A048		FP146	TVL-1725	
C3	40	450		AFH1-52		A048		FP146	TVL-1725	
C4	100	150		AFH1-21		A024		FP116	TVL-1423	
C5	100	150		AFH1-21		A024		FP116	TVL-1423	
C6	40	450		AFH1-52		A048		FP146	TVL-1725	
C7	50	50		PR850/50		BR505		TC39	TVA-1308	
C8A	10	450		AFH2-47		B037		FP231	TVL-2750	
B	10	450								
C9	.05	600		P688-05	DF-503	PTE6S5		PT615	6TM-S5	
C10	.05	600		P688-05	DF-503	PTE6S5		PT615	6TM-S5	
C11	.05	600		P688-05	DF-503	PTE6S5		PT615	6TM-S5	
C12	.01	1500		P1688-01		PTE16S1		PT1611	MB-S1	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	BELL SOUND PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1 Meg	½	B20066P61	Q13-137	AG-63-Z	B-70	U-53	Volume
B	Shaft		Not Req.	Not Req.	RS-2	Not Req.	Not Req.	Attach to R1A

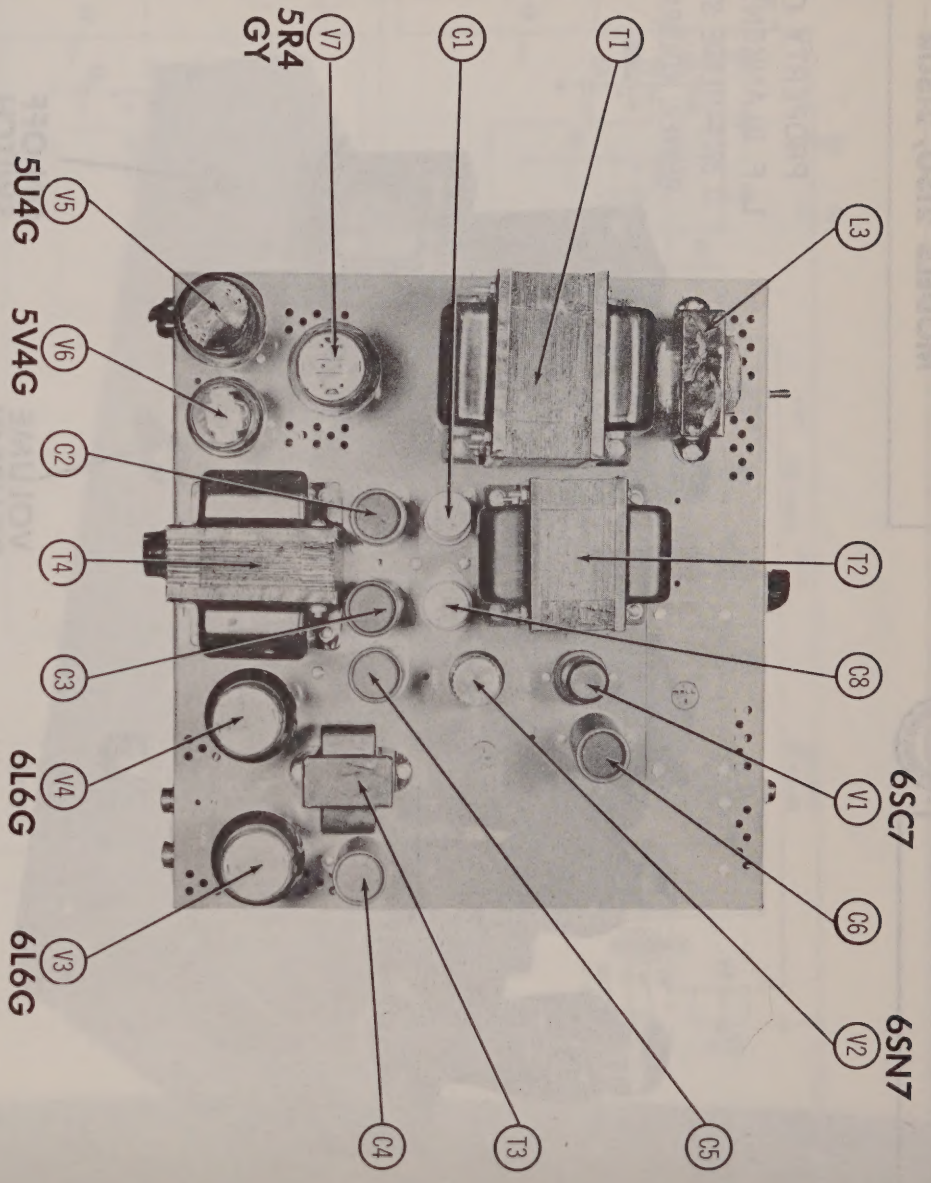
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	BELL SOUND PART No.	IRC PART No.	
R2	10KΩ	½		BTS-10K	Note 1
R3	560KΩ	½		BTS-560K	Note 2
R4	10KΩ	½		BTS-10K	
R5	820Ω	½		BTS-820	
R6	100KΩ	½		BTS-100K	
R7	100KΩ	½		BTS-100K	
R8	100KΩ	½		BTS-100K	
R9	220KΩ	½		BTS-220K	
R10	220KΩ	½		BTS-220K	
R11	680Ω	½		BTS-680	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	BELL SOUND PART No.	IRC PART No.	
R12	3000Ω	2		BTB-3000	
R13	25KΩ	20		2D-25K	
R14	150Ω	10		1 3/4A-150	
R15	200Ω	10		1 3/4A-200	
R16	25KΩ	20		2D-25K	
R17	100KΩ	1		BTA-100K	Note 3
R18	100KΩ	1		BTA-100K	Note 3
R19	270Ω	½		BTS-270	
R20	270Ω	½		BTS-270	

Note 1. Some models may use a 100KΩ resistor in this application.
Note 2. Some models may use a 620KΩ resistor in this application.
Note 3. Not used in all models.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	BELL SOUND PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117V @ .71A	105VCT .100ADC	516VCT .039A		B-20135 ①					
T2	117VAC @ .81A	226VCT .220ADC	5VAC @ 3A	5VAC @ 2A	B-20136					
			SEC. 4	SEC. 5						
			5VAC 2A	6.3VCT 3.8A						

① Primary has taps for 128V and 105V.

TRANSFORMER (INTERSTAGE)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	BELL SOUND PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T3	670ΩCT .007A (Each half)	244ΩCT			B-20075 ①					

① Turns ratio 2.7 to 1.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	BELL SOUND PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T4	3KΩCT	500Ω Tap @ 250Ω 100Ω 16Ω 8Ω 4Ω 2Ω	B-20084-7						

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	BELL SOUND PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L1	.100ADC	94Ω	5HY	B-20055				C-15X	
L2	.010ADC	490Ω	12.6HY	B-20058	C-1708 ①	C-2990 ①	R-1365 ①	C-13X	
L3	.039ADC	400Ω	19.6HY	B-20087					

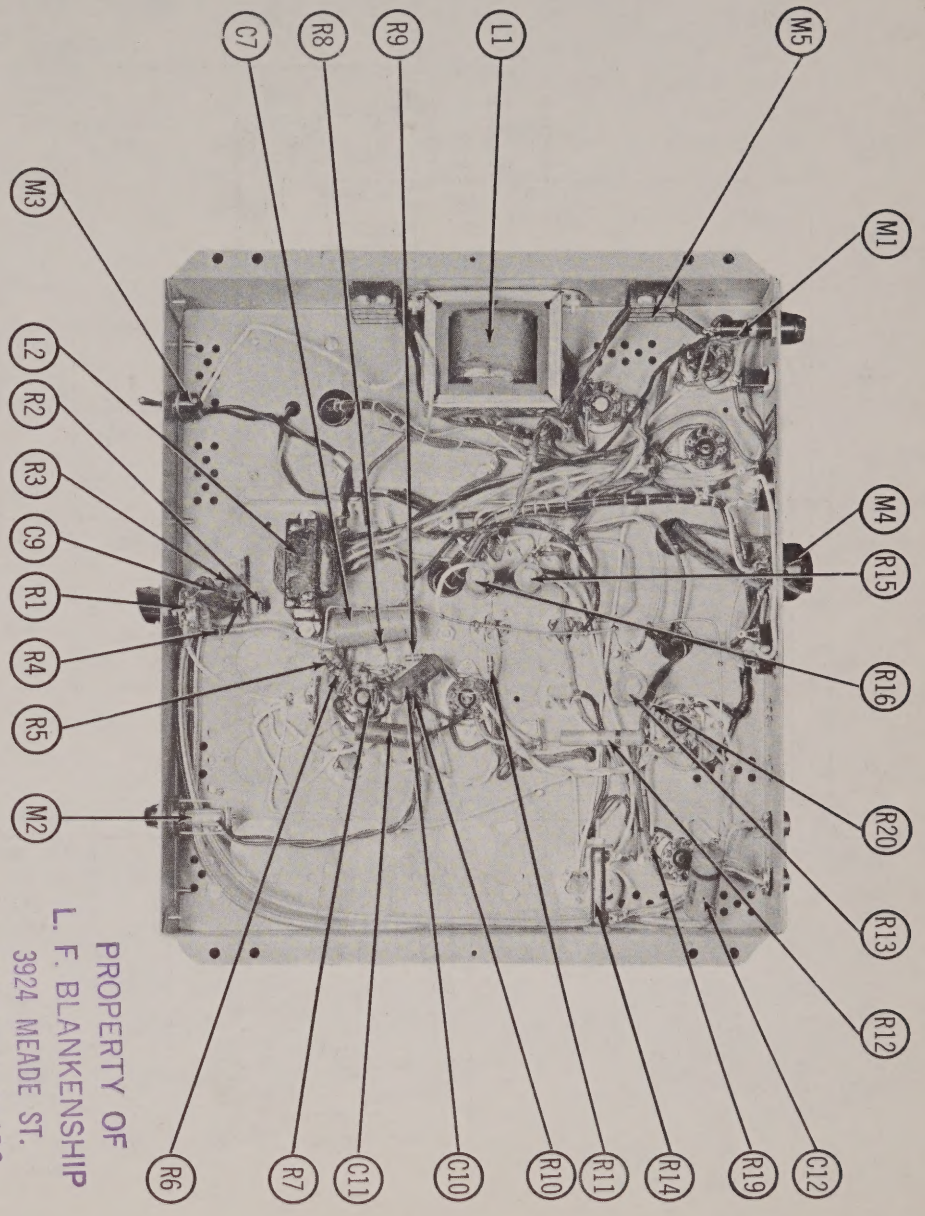
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			BELL SOUND PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	5A 32V			311005. (3AG-5A)	155020	MTH5	HDJ

MISCELLANEOUS

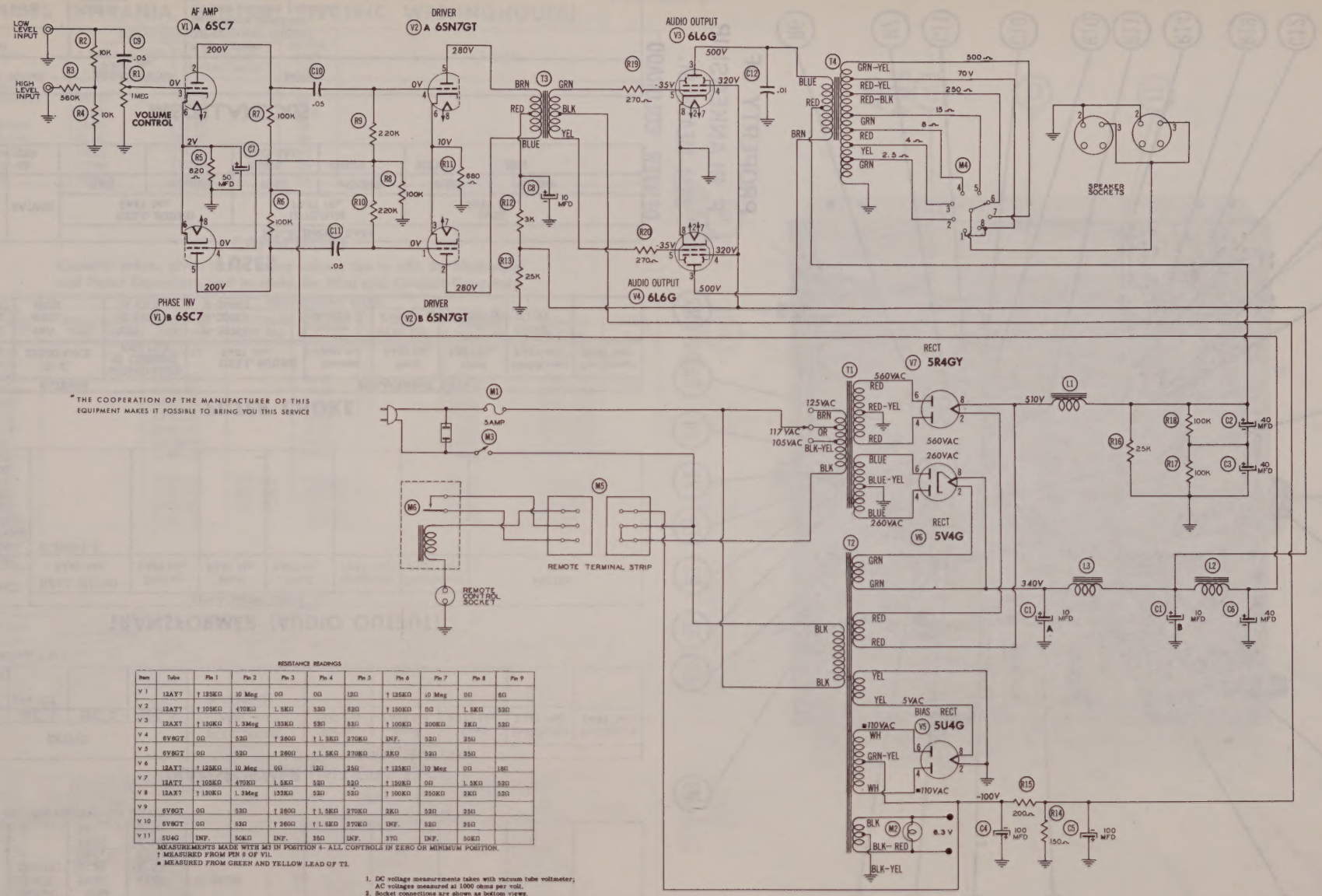
ITEM No.	PART NAME	BELL SOUND PART No.	NOTES
M2	Dial light		# 44 bayonet
M3	Switch		Off-on power (toggle)
M4	Switch		Impedance matching
M5	Terminal strip	C11383	Remote position } optional
M6	Relay	B11397P1	Remote position }

CHASSIS—BOTTOM VIEW



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

BELL SOUND MODEL 2150



"THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AY7	† 125KΩ	10 Meg	0Ω	0Ω	12Ω	† 125KΩ	10 Meg	0Ω	6Ω
V 2	12AT7	† 105KΩ	470KΩ	1.5KΩ	52Ω	52Ω	† 150KΩ	0Ω	1.5KΩ	52Ω
V 3	12AX7	† 130KΩ	1.3Meg	133KΩ	52Ω	52Ω	† 100KΩ	200KΩ	2KΩ	52Ω
V 4	6V6GT	0Ω	52Ω	† 260Ω	† 1.5KΩ	270KΩ	INF.	52Ω	25Ω	
V 5	6V6GT	0Ω	52Ω	† 260Ω	† 1.5KΩ	270KΩ	2KΩ	52Ω	25Ω	
V 6	12AY7	† 125KΩ	10 Meg	0Ω	12Ω	25Ω	† 125KΩ	10 Meg	0Ω	18Ω
V 7	12AT7	† 105KΩ	470KΩ	1.5KΩ	52Ω	52Ω	† 150KΩ	0Ω	1.5KΩ	52Ω
V 8	12AX7	† 130KΩ	1.3Meg	133KΩ	52Ω	52Ω	† 100KΩ	250KΩ	2KΩ	52Ω
V 9	6V6GT	0Ω	52Ω	† 260Ω	† 1.5KΩ	270KΩ	2KΩ	52Ω	25Ω	
V 10	6V6GT	0Ω	52Ω	† 260Ω	† 1.5KΩ	270KΩ	INF.	52Ω	25Ω	
V 11	5U4G	INF.	50KΩ	INF.	35Ω	INF.	37Ω	INF.	50KΩ	

MEASUREMENTS MADE WITH M3 IN POSITION 4- ALL CONTROLS IN ZERO OR MINIMUM POSITION.
† MEASURED FROM PIN 8 OF V1L.
▪ MEASURED FROM GREEN AND YELLOW LEAD OF T2.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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